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HENRY V. POOR, Editor.

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American Railroad Journal.

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Saturday, August 23, 1851.

New York and Galway Steamship Co.

Now that electricity and steam have become the great instruments of commerce, and for the transmission of thought, the routes by which merchandise and intelligence can reach their points of destination in the shortest possible time, and with the greatest security to the latter, are sure to command the public patronage. The great idea of the age is *speed*; and we attach such an importance to superiority in this respect, that we are always eager to patronise the *fastest* lines, even at great inconvenience, if we gain nothing but the *eclat* of having made "the shortest passage on record." But time in mercantile affairs has its value, as much as gold, silver, or corn; and that community is the richest, and bears off the palm of superiority, that has the command of the greatest amount of this commodity, or its equivalent, the power of abridging to the shortest limit, every business operation where *time* is an element. The great contests of the age are being waged, not in *wars*, but in the struggle for the *quickest* passage across the Atlantic. The sceptre of commercial greatness, and with this, of intellectual and moral superiority, awaits the victor in this contest.

It is in strict obedience to this idea, universally recognised, that the line of steamers from New York to Galway has been projected. We have beaten the Cunarders upon the route common to both. We must now beat the Collins' line by the opening of a new and more expeditious route. We must adopt the shortest route *absolutely*, and cut ourselves away from the monopoly of Liverpool, which has nothing but custom, and its great trade, to recommend it as the European terminus of our steam ship lines. Commerce, left free, will in the end acknowledge no such claims. Sooner or later it always takes the *shortest* route. To reach Liverpool, we are compelled to make a circuit of more than one-half of Ireland, and sail up a long and dangerous channel, in which ships are constantly exposed to delays, and to the danger of being wrecked. When the port of Liverpool is reached, vessels are obliged to have the tide in their favor, before the bar at the entrance to the harbor can be passed. In reference to this, we copy the following extract from Wilmer & Smith's European Times, of the 2d inst. In speaking of the recent arrival of the Baltic, it says:

"THE BALTIC.—The American Mail Steamship Baltic, Capt. Comstock, arrived off the Bell Buoy at half-past four on Tuesday evening, the 29th ult., where she lay till the returned tide enabled her to cross the bar. A small steamer met her at that point, took her mails and passengers, which were landed at *half-past six*. The ship entered the river at *half-past nine*. Her letters were delivered in Liverpool, London, Manchester, Glasgow and Birmingham, on Wednesday morning, and those for the Continent at noon the same day."

On the other hand, Galway is the *nearest* European port to the United States. It is very accessible, having sufficient depth of water for the largest class ships at all times of tide. Had the Baltic arrived at Galway instead of Liverpool on the evening of the 29th ult., her mails and passengers would have reached London on the following morning; and had she sailed for Galway direct, she would have saved *two full days* on her passage—a saving of vast importance to the commercial interests of the world. From Galway to Dublin, the railroad is now in operation, and passengers can proceed all the way to London by this mode of conveyance, with the exception of a few hours spent in crossing the channel. This route will not only be by far the most expeditious, but we believe it can be made the easiest and most agreeable one. There are few passengers, when the west coast of Ireland would be reached, that would not gladly leave the steam ship for a railroad. To passengers going to London, landing at Galway would simply prolong the distance to be travelled in this way.

While Galway is the *natural* transatlantic port for our ocean steamers, and must soon become the terminus of our passenger lines of steamships, the first efforts of the *New York and Galway* company will be directed to the formation of a line for the accommodation of the vast tide of emigration now pouring from Ireland to the United States. These emigrants now reach this country by way of Liverpool. The company propose to put the cost of passage at a low rate. In addition to this, taking passage at Galway will save a large portion of the present cost, and the impositions practiced, and hardships suffered, at Liverpool, and at other points, before embarkation. Instead of the long passages in sailing ships, so fruitful in disease and crime, only a few days will be occupied in the route by the steamers, and passengers can be landed without having their health impaired, as we find is too often the case in the present mode of transit. The steamers, properly managed, will achieve an act of *humanity*, as well as economy, and on this account deserve the encouragement of every friend of the emigrant. That the enterprise will be a most profitable one, we cannot doubt. Already, nearly 200,000 emigrants have arrived in this city alone during the present year; and before its close, the number will reach 300,000 or 350,000. A large portion of these come from Ireland, and would take passage in steamships in preference to sailing vessels.

This scheme, if properly carried out, will have results vastly more important than the mere carriage of passengers. It will let in a ray of light upon benighted Ireland. Men are trained and educated by being brought into contact with each other. A man isolated from all contact with his fellows, becomes an idiot. He retrogrades, instead of advancing. By association we borrow the ideas of others, and bring out and strengthen our own characteristics. The Irish are peculiar, not cosmopolitan, in their leading traits. Turn a stream of travel through that Island, and each traveller would, to a certain extent, leave behind him an impress of his own character, in the recollec-

tions of its people. All the fragments would gradually become incorporated into their national characteristics and ideas, and would, in the end, be the means of forming a new and better race. England is made what she is by the vast variety of elements which make up the aggregate of her national mind. Ireland has never been thoroughly subdued. England has been, a great many times; and the result is, that the most valuable qualities of all the races, or nations, that have there contended for the mastery, remain. Each different people obtained sufficient foothold to make themselves felt to the present time. The English national character, therefore, is broad and comprehensive, adapted to every emergency, and equal to every crisis. The Irish are still fragmentary. They are great only in particular directions. This explains the cause of their present condition, and accounts for their never being able to throw off the English rule. They need other qualities, and these can be introduced only by bringing other races among them.

We are glad to learn that there is every prospect that the above scheme will be well carried into effect. A meeting of its friends was recently held in this city, at the office of H. B. Tebbetts, No. 40, Wall Street, at which Dudley Persee, Esq, acted as chairman, and Joseph Stuart, T. A. Emmitt, John B. Dillon, Robert E. Kelly and S. Draper, acted as secretaries, which resolved, that in view of the large and increasing emigration from Europe, especially from the British Islands, to this port, it is due to humanity that steps should be taken to lessen the hardships now endured by the less wealthy classes of Emigrants, by placing within their reach the means of cheap and rapid passage across the Atlantic, thus saving them the privations and sufferings attendant on a long voyage; that the formation of a line of first class steamers between the port of New York and Galway cannot fail to promote the lasting interests of commerce, and that it would greatly facilitate the transmission of correspondence between this country and Ireland.

At a meeting of the Board of Aldermen of this city, held on the 13th inst., a resolution was adopted strongly recommending this enterprise to the support and encouragement of the community, as being a means of cheapening and expediting communication between the United States and Europe, and being eminently calculated to promote the interests of commerce between New York and Great Britain.

For the American Railroad Journal.

Marietta and Philadelphia, vs. the Parkersburg and Baltimore Railroads.

H. V. Poor, Esq.

From several articles in your valuable Journal, in regard to the above projected railroads, I notice much interest has been excited, which is no matter of surprise, when the importance of the enterprise to the various interests involved is considered, and the effects especially upon the two cities named are fully ascertained and understood. The truth is sought, not mere speculations; and I presume your columns are open to a fair discussion of the subject upon its merits. I propose, therefore, to give my views upon the question.

Not having observed the article commented upon by "Baltimore," I must confine my remarks to a review of that of the reviewer, re-published in the Patriot of the 5th inst.

The first and main point in the controversy, and the one upon which the merits of the case chiefly turn, is that of the relative distances (or time), say from Athens, Ohio, the first point in the west, common to both routes, to the city of Philadelphia. I say Philadelphia, for this may be fairly taken as the eastern point to be reached; and, in a business point of view, this seems to be conceded by "Baltimore," inasmuch as no effort is made to show that any great importance should be attached to the city of the same name, as a point to which any considerable portion of the trade and travel of southern Ohio, Kentucky and Tennessee is destined. This inconsiderable fraction, moreover, is likely to be diminished, by equal facilities for trade and travel direct to Philadelphia by the proposed road—a large portion having hitherto been compelled to pass through Baltimore to the cities of the south.

In discussing the matter of distances, I dissent entirely from the *very convenient method* adopted by "Baltimore," of measuring distances on the map, and adopting a *sliding scale* in adding ¼, ⅓, or any sum he may find necessary, to produce a desired result, or distance; as, for example, he says from Marietta to Athens, 34 miles, add ¼, making 42 miles; whereas, this line has been surveyed under the direction of the chief engineer of the Belpre company, and ascertained to be 38 miles, and it may yet be diminished; or upon his favorite route from Parkersburg to Three Forks Creek, he seems to be very liberal in adding ⅓ to the air-line, producing 115 miles as the result, whereas 140 miles will be ascertained to be nearer the true distance.

I shall adopt, in my table of distances, what I believe in each case the best and most reliable authority will warrant. The precise distance has been ascertained on the Parkersburg route, except from Parkersburg to Three Forks creek, which I place at 120 miles, believing at the same time that 130 miles will be ascertained to be nearer the truth. Such is also the fact upon the Marietta route, except from Greensburg to Marietta, which I assume to be 150 miles, with more than equal chances that it will be diminished.

1st. Philadelphia, via Baltimore, to Athens—

Philadelphia to Baltimore	98 miles.
Baltimore to Cumberland	179
Cumberland to Tygart's Valley bridge	101
Tygart's Valley bridge to Parkersburg	120
Parkersburg to Athens	36
	534 miles.

2d. Philadelphia, via Hempfield and Marietta, to Athens—

Philadelphia to Greensburg	323
Greensburg to Wheeling	75
Wheeling to Marietta	75
Marietta to Athens	38
	511 miles.

Lineal difference in favor of Marietta route ..... 23 miles.

I will apply a test more satisfactory to the traveller. Measuring railroads by miles is an "obsolete idea." It must be done by hours.

1st. Philadelphia, via Parkersburg—

Philadelphia to Baltimore by the Wilmington railroad, *their express mail time*	6 hours.
Baltimore to Parkersburg, 25 miles per hour	17½
Add for loss of time by high gradients	2
Average delay crossing the Ohio at Parkersburg, for want of a bridge, which cannot be supplied	0½
Belpre to Athens	1½
	27½ hours.

2d. Athens to Wheeling, 25 miles per hour	4½ hours.
Wheeling to Philadelphia	16
	20½ hours,

bringing Athens actually one hour nearer to Philadelphia than to Baltimore. The reader may ask—why 6 hours from Baltimore to Philadelphia? The experienced traveller needs no explanation.—It is occasioned by the loss of time in crossing the Susquehanna river in boats; the Gunpowder, and various streams and indentations of the Chesapeake, by long trestle bridges, at very slow speed, which probably will never be remedied. There is little doubt that the same locomotive will start west from the junction of the two roads (if both be constructed), with the passenger trains from Philadelphia and Baltimore, which leave those cities at the same hours. Passengers and trade going east, will also arrive at Philadelphia and Baltimore at the same hours. Hence travel, etc., destined to Philadelphia, and north of that city, will take the Marietta and Hempfield route; that going to Baltimore and Washington will prefer the Parkersburg route. Those familiar with the business of the great west and southwest, agree that fully seven-eighths of this trade and travel are destined to Philadelphia, and north of that city; hence it becomes the managers of the Pennsylvania railroad to take early measures to compete with the Baltimore movements, by leading off in securing the extension of the Marietta road to Wheeling, thereby speedily bringing this vast trade and travel to their line.

I am aware that 83 miles is claimed as the distance from Wheeling to Greensburg; this I do not concede. A controversy on this point, however, will avail nothing; besides the precise distance will soon be ascertained. I have good authority for believing it will be less than 75 miles. The route from Marietta to Wheeling, via the Little Muskingum river, to a point near the mouth of Sunfish creek, thence to Wheeling, has not been surveyed. Those most familiar with the route are of opinion it will be less than 70 miles, if favorably constructed; and no grade exceeding 10 feet.

The actual difference in the length of these two great lines will be accurately determined only by instrumental survey; until then it must remain a matter of opinion. I concede to others the full enjoyment of theirs, and claim the right to my own; and shall not concede, until it is proved by actual survey to the contrary, that the lineal difference in favor of the Marietta route to Philadelphia, is less than 30 miles. I believe it will be nearer 40.

In regard to grades, I am unable to institute a full comparison, for the want of a profile of the Baltimore and Ohio railroad. I proceed with a comparison, however, so far as data within my reach will allow. 1st, "Upon each side of the ridge, between the Potomac and Patapsco, the Baltimore and Ohio railroad has gradients of 82 feet per mile on curves of short radii; and in overcoming the Alleghenies, they ascend for 11½ miles at 116 feet per mile, and 105 feet for 3½ miles, thence following for 19 miles the *summit of the mountain*, it descends at 116 feet per mile for 8½ miles, to the valley of the Cheat river, from whence they ascend Laurel Hill at 105 feet per mile for 5 miles, and descend on the other side at the same rate for a like distance;" 2d, "The Pennsylvania railroad *has no westward gradient* exceeding 21 feet per mile, or eastern greater than 10½ feet, until it reaches the base of the Alleghenies, 130 miles; and this barrier is overcome by a maximum gradient of 84½ feet on *straight lines* for 12½ miles. Thence to Pittsburg, the maximum gradient is but 50 feet per mile, and upon more than one-third of this distance continuously the gradients do not exceed 26·4 feet per mile."

The extent of the gradients between the Potomac

and Patapsco, when considered in connection with the short curves, are probably equal to the mountain gradients of the Pennsylvania railroad; and conceding, for comparison, the residue of the Baltimore road to be equal to the Pennsylvania road, it will leave the high gradients of the Baltimore road detailed above, as the excess to be equated and their final effects ascertained and determined upon time or distance [being the same in effect] and the cost of transportation. I suppose this can not be done by any arbitrary rule, as various circumstances enter into the calculation. Conflicting theories are held among railroad engineers of equal talent and experience upon this subject. The aggregate of ascents and descents of the Baltimore road, in overcoming the Alleghenies alone, is as follows:

Ascents.			
11¼ miles, at 116 feet			2,334
8½	"	105 "	892½
			3,226½
Descents.			
8½ miles, at 116 feet			986
5	"	105 "	525
			1,511
33½ miles.			4,737½ ft.

Showing a total of ascents and descents of 4,737 feet in the mountain range—being to that extent an excess over the Pennsylvania road. Adopt 66 feet of ascents and descents as equivalent to one mile, and the loss to the Baltimore road in the difference in gradients is about 72 miles, which added to the lineal difference of 23 miles, practically makes it 95 miles nearer to Philadelphia, through Marietta and Wheeling, than through Parkersburg and Balsimore from Athens or Chillicothe, Ohio. I hazard the opinion that there is not an experienced and disinterested railroad engineer in the United States, who would not in locating a railroad, concede a mile in distance in preference to incurring a gradient of 66 feet. For authority to sustain a high gradient as equivalent to a mile, reference is had to the Report of B. H. Latrobe, Esq., Chief Engineer of the Baltimore and Ohio railroad company, in the controversy between said company and the city of Wheeling, in comparing the relative merits of the Grave and Fish creek routes.

To those who may be curious to probe this subject still further, it will be interesting to refer to a Report of Col. Childs to the Mobile railroad company, in which this distinguished engineer publishes a table showing the comparative gradients, and other distinctive features, of the Baltimore and Ohio, the Pennsylvania, and the New York and Erie railroads. If this disinterested and high authority will not fully warrant the opinion, that a passenger or a barrel of flour can be transported as quickly and as cheaply from Chillicothe to Philadelphia as to Baltimore, then further speculations on this subject will be useless. In regard to the Central Ohio railroad, or the proposed Lancaster, Wilmington and Zanesville road, it is claimed by Philadelphia, and conceded by "Baltimore," that those will bring direct to the lap of Philadelphia the trade and travel of Cincinnati—and for this purpose I concede the Marietta road is unnecessary and own it for this trade we are seeking, Philadelphia would content herself to abide the kind counsel of "Baltimore," and "help the substantial Central Ohio, and not the *chimerical* Marietta scheme." The Marietta road is nevertheless important to Philadelphia, in view of the large local trade which will find its way from the country it traverses, and the rich valley of the Scioto, to this city, as well as its full share of through business from Cincinnati.

But, Mr. "Baltimore," there are *southern branches and connections to this great south Ohio line, which are peculiarly attractive to Philadelphia;* these, added to the vast local trade of this south Ohio line, and you have *one of the most important* railroad thoroughfares *in America*. These lines running from the Marietta road west of Athens, [through one of the richest mineral fields in the world] to Portsmouth, then crossing the Ohio river, 210 miles [by the river, and 122 miles only by the railroad,] below Marietta, thence following the river to Maysville; there intersecting the great Kentucky line of railway, stretching through Lexington, Loulsville, Danville, etc., to Nashville in Tennessee, at which point railroads are centering from South Carolina, Georgia, Alabama, Mississippi, Louisiana, West Tennessee, etc., forming a grand reservoir of trade and travel, from which an immense stream of southern business must flow northward through Kentucky to the great Atlantic cities of the north and east—a trade and travel which will far exceed in amount that which can ever be commanded by any one or even two of the roads stretching directly westward to St. Louis from the Atlantic cities. The vast trade of Kentucky and Tennessee has been enjoyed by Philadelphia almost without a rival since the settlement of the country. She regards it as the "apple of her eye;" she will never relinquish it voluntarily; no sum will purchase a quit claim to it; but as Mr. "Baltimore" seems to be particularly interested in our welfare, very fearful we shall squander our money—if he will point out a better or more direct route by which to bring this vast Philadelphia trade direct to her lap, than through Marietta to our own Pennsylvania railroad, and one which will cost less money, we will consider the propriety of adopting it; and if on investigation it is found a better project, we will give the "go by" to the "*chimerical* Marietta scheme.

The last paragraph of your article, Mr. "Baltimore, seems to be somewhat minatory in its tone. This results from two causes: disappointed hopes, and erroneous views as to your remedy. Let me correct the error into which you have been betrayed in your intercourse with unscrupulous parties, whom you have mistaken for friends. You warn Chillicothe to be careful lest they provoke the construction of a road from Parkersburgh to Cincinnati (for which you say there is an independent charter) by a more southern line across Ohio, leaving Chillicothe several miles to the *north*. You have been duped, Mr. "Baltimore." *There is no such charter*. The Hillsboro' company are authorised to extend their road *to Marietta*, or to any point on the Ohio north of Marietta; they are *prohibited from going to Parkersburgh*. Under the present constitution of Ohio, a practicable railroad charter cannot be obtained; aid from towns, cities and counties is prohibited; above and beyond all this, you cannot obtain a shorter and a practicable route as you propose, even if you possessed all the other requisites, unless your fancy for high grades should lead you to devise a few more of 116 feet.

Mr. "Baltimore," why this threat? Whence all this alarm and feverish excitement, if the Marietta scheme be "chimerical?" Why concern yourself so much for Philadelphia interests? Your counsels have not been sought. *The answer is but too apparent*. It is your own interests, and not those of Philadelphia, for which you are concerned; this Philadelphia scheme to intercept the trade of the southwest on the banks of the Ohio river, and bring it direct to our city over our Pennsylvania raad, is *competition* from an unexpected source.—The success of the enterprise is too easily seen; it is beyond a doubt; it cannot fail; Philadelphia is only aiming to bring a trade which is hers by preemption, by the most direct, and by *her own thoroughfares*, into her lap. She does not seek to rob Baltimore, for Baltimore has comparatively no trade from Kentucky and Tennessee of which to be robbed. She must, however, submit to lose the business of furnishing a supper and breakfast to the western traveller destined to Philadelphia—a loss she will deeply feel, as to her it has been an important item, inasmuch as the National road and other improvements have made the Baltimore route hitherto the desirable one to this city, even for the Pittsburgh, as well as the western and southwestern traveller. But this "chimerical Marietta scheme," added to our Pennsylvania road, and its other connections, will bring direct to Philadelphia nearly all the trade and travel which has hitherto passed through Baltimore to the north, except so much as is direct from the south and from the east slope of the Alleghenies. Within two or three years, all this trade and travel will find its way to its proper destination by the *Pennsylvania routes*, if Philadelphia affords at an early day the small aid required, when it will be inevitably and forever lost to Baltimore, without hope or chance of recovery.

PHILADELPHIA.

On the Gauge of Railroads.

ENGINEER'S OFFICE, PACIFIC RAILROAD,
St. Louis, 27th June, 1851.

THOMAS ALLEN, ESQ., *President:*

Sir,—In compliance with a resolution of the board in regard to the width of gauge for the Pacific railroad, I have to submit the following observations:—

What is termed now the "narrow gauge," is the prevailing gauge of the majority of the English railroads, and of the majority of the railroads in the New England states, and the states of New York and Pennsylvania.

This gauge gives a width between the rails of 4 feet 8½ inches.

The "narrow gauge" was adopted in England at a time when horses were used upon railroads, and before locomotive power was introduced. The Stockton and Darlington railroad followed the gauge of the railroads connected with the extensive collieries of that neighborhood, which had been found sufficient for the purposes of freight, and for the light passenger business which the indifferent accommodations of that day created. The Liverpool and Manchester railroad followed the same gauge, although locomotives were in use on the Stockton and Darlington road at the time of its construction, but these were so imperfect in their results, and so incapable of rapid motion, that it was a question then whether fixed engines or locomotive engines should be adopted for motive power on the Liverpool and Manchester road. The introduction of the "narrow gauge" was not the result of an experience of what was best suited to locomotive power. Its adoption had no reference to that power, and was in a great measure accidental.

The railroads which followed the "Liverpool and Manchester," after its successful accomplishment, copied that road as their model. The engines first used on the Liverpool road, and on all roads built within ten years of its date, were very much smaller in capacity than those which are used now, and no inconvenience was complained of then in regard to the width of gauge being insufficient to admit of a convenient and economical plan

of locomotion. When a different gauge began to be seriously thought of, the extent of railroads in existence, all after the same model, rendered it very questionable whether the inconvenience attending the introduction *then* of a different and wider gauge, would not exceed any advantage which theoretically might be demonstrated of it. This was the state of the case in England at the time that the seven foot gauge was introduced on the Great Western railroad, and it is the state of the case in the New England states now, (Maine excepted) where a road of wider gauge than 4 feet 8½ inches, if constructed now, would be cut off at great inconvenience, from communication with the numerous railroads in operation there.

The immense freight and passenger business which has gradually accumulated in the neighborhoods of railroads, has led, step by step, to the introduction of very large and powerful machines, requiring, it is contended by many, for their economical and stable arrangement, a greater width of track than that originally adopted when horse power was applied to railroads, and when machines of one fourth the size of those now used were competent to do the business which then presented itself.

The application of as large engines as the strength of the road would admit of, to the freight business, enabled that business to be done more economically, promptly and safely. It could be done more economically (within limits governed by the strength of the road), because the engine drawing 100 tons of freight, required the same attendance as the engine drawing 200 tons of freight, and the fuel consumed was greater in proportion for the small engine, than for the larger one. It could be done more safely, because the fewer trains there are on a road, the less risk there is of accidents and collisions, and for similar reasons it could be done more promptly, because with the fewer trains, there is less loss of time by delays at passing places, waiting for opposite trains.

There are exceptions to condensing the passenger business in this way. Where the country is densely populated as in the neighborhood of large cities, the population is best accommodated by frequent trains carrying a limited number of passengers and light locomotives can be used with great advantage. But where the country is thinly populated, the passenger business to be done with profit to the company, must be done by large trains running once or twice a day either way, and filled up, (as on your road, for instance,) from a great number of stations, on a distance, in this case of 300 miles of railroad. This kind of business to be done promptly, requires large and powerful engines, because the passenger locomotive must have enough of surplus power to enable her to make time under all the irregularities due to occasional crowded trains, and to that moist state of the rails which reduces so importantly the adhesion of the driving wheels.

When the public was satisfied with 15 and 20 miles an hour for passenger traffic, a smaller class of locomotives could do the business, than is necessary now when a rate of 25 to 35 miles an hour on the road must be kept up ordinarily, to make the time, which, including all stops, gives the average of 20 miles an hour of "accommodation trains." Experiments show that the traction on a level is, at 20 miles an hour, from 12 to 14 lbs. per gross ton, while at 30 miles an hour the traction is from 17 to 22 lbs. per gross ton; requiring at 30 miles an hour, the application of nearly double the power required for 20 miles an hour.

Experience supplies ample proofs of the value of powerful engines for a heavy freight business, and for a long passenger business. The desire to economise in this direction, has indeed been carried further than the present strength of our roads justifies, and it has become a question whether the damage done to the track in consequence, has not in many instances exceeded the advantage done to heavy engines and large trains.

I have called your attention to the powerful engines which have gradually come into general use, and the reasons for their introduction, because, if our practice in that particular has been erroneous in principle, and light engines for all the business of the road are to be preferred, one of the prominent reasons advanced in favor of an increased width of gauge, falls to the ground.

The reasons advanced in favor of a greater width of track, are mainly the following:—

1st.—As regards the locomotive—

That a greater width admits of a better proportioned boiler, better arranged, and therefore more economical as regards the heating surface in the fire box, compared with the tube surface.

That it admits of a lower position of the boiler, and consequently of a more stable machine on the road.

That it admits of the application of larger driving wheels, which reduce importantly the velocity of the pistons, and of all the gearing connected with them, and hence the general wear and tear of the engine.

That for the maximum velocity of the piston rod, (there being a limit to that velocity) if the wider gauge admits of the use of larger driving wheels, it admits proportionally of a greater maximum rate of speed.

All these advantages are more or less attainable, and the testimony of engine builders generally, is in favor of a greater width of gauge to secure one or other of them; but opinions are very various in regard to the precise width which should be adopted.

2d.—In regard to the cars—

The passenger car on the narrow gauge is not of sufficient width to give comfortable sitting room for the passengers. The space allotted to each passenger is too confined, and does not admit of that change of position so essential to comfort on a long journey.

The cars of the New York and Erie road, which has a wide gauge, are in this respect very sensibly superior to those of the narrow gauge roads, and the additional comfort is very generally acknowledged.

This is a matter of a good deal of importance, when we consider that the larger half of the profit of the road, will by-and-by be derived from its passenger business. For freight cars an increase of width is of less consequence, though for bulky articles, whose weight will not make up a carload, it becomes very convenient, and economises the number of cars necessary to be used.

The lengths of the cars in either case do not differ essentially.

The difference is mainly in the width, whether of passenger cars or freight cars. The number of passengers carried is not increased,—the number of tons carried in each freight car is increased in the present practice in the ratio of about 1-10 of the load.

The dead weight carried is a little greater for the passenger cars per passenger, but for the freight cars per ton, it is not quite so great. In these comparisons I am thinking of the gauge of the New York and Erie railroad. The cars are believed to be more steady on a road under a greater width of gauge, and the engines also, in consequence of the greater base on which they operate.

The objections to any increase in the width of gauge are mainly as follows:

The cost of the graduation and masonry of the road is increased.

This increase is in proportion to the addition made to the width of gauge.

If we take as an example a width of five feet six inches, and compare it with the width of the narrow gauge, 4 feet 8½ lnches, the increase would be 9½ inches.

If we assume the excavations on a mile of road to average 15 feet in depth, which for your road will be a liberal average, and take five per cent of this as rock, we shall have 1,218 cubic yards of earth as, say 18 cents, plus 61 cubic yards of rock at 60 cents, equal to $255 30
Add for masonry, &c 200 00

$455 30

Say $460 per mile for graduation and masonry.

For 100 miles this would give $46,000, and for 300 miles of $138,000, say $150,000 as the increase of cost on your road due to a width of gauge of 5 feet 6 inches, as compared with the narrow gauge.

The amount of land occupied would not be increased, and we have not found in practice that the cost of the superstructure is increased, although the cross ties are necessarily longer for the wide guage than for the narrow one.

The weight of the axles of the cars is increased —for a guage of 3½ feet the additional weight per axle would be 19 lbs; per car it would be 76 lbs, which at 5 cents per lb would amount to $3 80 per car. The addition would be a little greater in the axle of locomotives.

The friction in passing round curves in the slip of the outer wheel will be a little greater as the gauge increased. If we take 1,000 feet of a three degree curve, (1910 feet radius,) the outer wheels of the cars would have to travel 2 4-10 inches further on a 5½ foot gauge than on the narrow gauge. On a 5 degree curve (1,146 feet radius) for the same distance, the outer wheels would have to travel 4 1-10 inches further on a 5½ gauge than on the narrow guage.

It is objected to any change of gauge—that it interferes with a connection with other roads, and with the interchange of cars on other roads, and the passage of new cars and locomotives from one section of the country to another. The first part of the objection is not applicable to your road. The Mississippi river cuts this road off from all direct connection with the Illinois roads,—and the lines or branches to be built hereafter in connection with your roads will in all probability, follow the gauge of the trunk line. The transfer of cars and engines, built in another State need hardly be considered, inasmuch as all these will eventually be built in St. Louis. Here, the Mississippi bridged, it would doubtless be convenient to be able to transfer cars from one road to another.

The variations from the narrow gauge throughout the United States, are to the best of my knowledge as follows:

The Sandusky and Cincinnati railroad, the Xenia railroad, the Columbus and Cleveland railroad, and generally the Ohio railroads have a width of 4 feet 10 inches.

The Sandusky, Mansfield, and Newark railroad 5 feet 4 inches.

The Georgia railroads, 5 feet.

The South Carolina railroads, 5 feet.

The Mobile and Ohio railroad, 5 feet.

The New York and Erie railroad and its branches, 6 feet.

The St. Lawrence and Atlantic railroad in Maine and Canada, 5 feet 6 inches.

Mr. C. W. Whistler, the late engineer of the Boston and Albany railroad, after his transference to Russia as engineer of the Moscow and St. Petersburgh railroad, recommended for that road a width of 5 feet, which was adopted. I mention his name in connection with this question, because as an engineer he was more highly esteemed than any other man in this country.

In fixing upon a gauge for your road you are not tramelled by considerations of convenience, affecting your connections with other roads. You are so situated as to be able to choose the gauge best adapted without much increase of expense to the requirements of a railroad so far as we understand them now. Unfortunately, our experience of the different made guages which have been tried is not so precise as to indicate which is the best, nor can we foresee what form any future improvements in locomotive power will take.

We have the general testimony of engineers and engine builders in favor of a greater width of gauge than the narrow gauge for the convenient arrangement of the locomotive machine; and we know that the passenger business is much more comfortably accommodated by an additional width of gauge.—But these two general truths cannot be put into the shape of a problem capable of defining, after allowing all objections full weight, the exact width to be applied.

My own opinion is in favor of a gauge 5 feet 6 inches.

The New York and Erie gauge of which I have had some experience, is 6 feet.

With a gauge of 5 feet 6 inches we can obtain a sufficiently commodious car for passengers, and we can secure a very commodious and stable engine.

The engine builders with whom I have talked on the subject are satisfied with this gauge. The testimony of English engineers and machine builders taken before the English gauge commission in 1846, leans to a gauge of 5 feet 3 inches, and the gauge recommended for all railroads in Ireland, and I believe adopted by the British government, was 5 feet 3 inches. In England, however, there was and is now a strong party feeling against any increase of gauge, formed on the great inconvenience attending any break of gauge there, where the majority of the railroads in existence have the narrow gauge. I should therefore consider the opinion expressed there that 5 feet 3 inches, was a proper gauge for a new country, as equivalent to an admission of the value of a still greater width. It is proper to bear in mind that the arguments in favor of an increased width of gauge on English roads do not apply to with the same force at present to American railroads, inasmuch as they are formed mainly on the requirements of engines for very high velocities, such as do not prevail at present with us. A rate of 50 miles an hour is frequent in England, while a rate of 30 miles an hour is the maximum here.—But our present position in that respect should be viewed as a temporary one.

Although my own opinion is in favor of a guage of 5 feet 6 inches, the road can be worked as well as other roads are worked with a gauge of 5 feet or 4 feet 8½ inches as the Board may deem most advisable under all the circumstances.

Respectfully submitted by

JAMES P. KIRKWOOD.

NOTE 1ST. Memoranda in regard to the driving wheels of Locomotives:—

Diameters of driving wheels.....	3ft.	4ft.	5ft.	6ft.	7ft.
Circumference of do.	9·5	12·7	15·8½	18·9	22
Revolutions per mile	560	420	336	280	240
Revolutions per minute. or double strokes of piston, at					
12 miles an hour..	116	87	70	58	49
Do at 15 do ..	140	105	84	70	60
Do at 20 do ..	186	140	112	93	80
Do at 25 do ..	232	175	140	116	100
Do at 30 do ..	280	210	168	140	120
Do at 35 do ..	326	245	196	163	140
Do at 40 do ..	374	280	224	187	160

NOTE 2ND. Memorandum of evidence on the subject of gauge, before the English Gauge Commission, 1845:—

J. Locke, Civil Engineer—Would have "wider than 4 feet 8½ inches—less than 7 feet.

G. W. Viquoles, Civil Engineer—"Prefers 6 feet gauge."

Col. George Landman, Civil Engineer—"Prefers increase on narrow gauge, decidedly."

Edward Bury, Manufacturer of Locomotives—"Prefers an extension of 6 or 8 inches for the machinery." (5 feet 2 inches, or 5 feet 4 inches.)

Benjamin Cubitt, Locomotive Engineer—"considers 5 feet 3 inches, ample, and wanted for more effective locomotives."

W. Cubitt, Civil Engineer—"A gauge of 6 feet the best that can be adopted."

Capt. J. M. Laws, Manager of Manchester and Leeds Railway—"A gauge of 5 feet, or 5 feet 6 inches would be an excellent gauge."

John Gray, Locomotive Superintendant—"Prefers a wider gauge than that of 4 feet 8½ inches—would recommend 5 or 6 feet in a new country."

Daniel Gooch, Superintendant Locomotives Great Western Railway—"Prefers 7 feet gauge."

S. Clarke, Manager of Brighton railroad—"Prefers 7 feet to 6 feet 6 inches."

J. R. Brunell, Civil Engineer—"7 foot gauge."

George Bodmer, Manufacturer of Locomotive Engines—"Prefers as an Engine maker, an addition of 6 or 8 inches to the narrow gauge."

M. Fernihough, Locomotive Superintendent Eastern Counties railway—"Would recommend 5 feet."

Mark Huish, Manager of Grand Junction railroad—"Prefers narrow gauge. In a new country would recommend 5½ feet.

R. Roberts, Locomotive manufacturer—"Considers 5 feet to 5 feet 4 inches sufficient for the machinery."

Nicholas Wood, Civil Engineer—"Would have been advisable in the early stages of the railways, to have increased the narrow gauge a few inches.

Major General Pasley of Royal Engineers—"the most eminent engine makers and engineers, in reply to circular letters from the Board of Trade, stated that they considered 5 feet to be the narrowest and 5 feet 6 inches the widest guage required."

George and Robert Stephenson, Civil Engineers &c.—"Narrow guage sufficient. For Ireland considers the guage of 5 feet 3 inches recommended the best."

New York.

Erie and North East Railroad.—The question as to the width of the guage on this road, has been settled by the adoption of the sixth foot track, the same width as the New York and Erie road. The rails are now being rapidly put down, the ceremony of driving the first spike having been performed on the 30th ult.

Illinois.

Alton and Sangamon Railroad.—This is one of the most promising of our railroad projects. When completed, it will connect the capital of the state with the Mississippi river, at its nearest practicable point, by a line of about 70 miles. The road is to be an exceedingly important one, both from its local business, and from its connection with other roads. As a *local* road, it must always constitute the outlet for the Central portions of Illinois, to the Mississippi river. The great fertility of this portion of the state is well known; and though Illinois, as a whole, is very sparsely populated, the portions traversed by the above line will compare favorably with the best settled parts of Indiana and Ohio, and are not excelled, if equalled by either, in extent of natural resources. It is to accommodate this portion of Illinois that the above road is to be constructed, and upon it will be thrown the immense products of that rich and populous portion of the state.

In looking at the prospective business of Western roads, we believe a much more correct estimate can be found of its extent, from a general view of the productiveness and course of trade in that section, than from the most elaborate compilation of statistics drawn from existing data. The amount of production, and extent of movement of property, is now subordinate to the *means* of transportation. Some of the most fertile populations of Illinois are valueless, simply for the want of a suitable outlet to a market. Many sections, that are destined to be the most flourishing, are still covered with forests. In many portions of the state the surplus of grains raised will not bear the cost of carriage to navigable waters. The rivers of Illinois, the present route of commerce, though invaluable in the absence of railroads, are for a considerable portion of each year not available for transportation. From the commerce that has already been developed, we can form but a faint idea of what is to come, when the suitable avenues and instruments shall have been provided. The great amount sent to market under all the difficulties that now stand in the way, will bear no relation whatever to the vast volume when all these shall be removed.

But waiving generalities, and adopting the ordinary mode of reasoning pursued in similar cases, and taking the *past* as the exact measure of the future, we believe that the above company makes out a case as strong as that of any other road whose claims have been presented to the public. That it may be seen what these claims are, tested by the above standard, we have prepared some statistics to which we desire to call the attention of our readers.

1st.—By the census of 1850 the amount of corn, wheat, oats, barley, wool, hay and potatoes, produced within 15 miles of the line of the railroad, exceeded 300,000 tons. Estimating ¼ to be carried to market, (leaving ¾ to be consumed or changed in character at home), and taking 38 miles as the average distance carried, and 4 cents per ton per mile as freight, and we have 75,000 tons; which at $1 52 per ton, would yield a revenue of $114,500.00.

2d.—There have been for the past few years, over 30,000 hogs killed and packed at Alton, and over 100,000 hogs killed and packed at St. Louis, annually; a very large portion of these were raised in the counties along, and adjoining the road, and were driven to Alton and sold, or shipped thence to St. Louis. It will be safe to say at least ¼ of the whole number would be conveyed over the road at

an average of 25 cents per head, which would give $10,833.

3d.—There is an average of over 20,000 beef cattle per year driven down to St. Louis and Alton, along, and within 15 miles of the line of the road. At least ½ of these would be forwarded by railroad, at an average cost of $1.50, which would give a revenue of $10,000.

4th.—We estimate the returning freight of salt, iron, machinery, merchandize and groceries, at ½ the down freights specified in the first item. This will equal 25,000 tons; which at 5 cents per ton per mile, over one-half the road (38 miles) will give $1.90 per ton, equal to $47,500.

5th.—It is thus estimated by those connected with the coal and lumber business at Alton, that there will be sent up the line at least 30,000 tons, and when it is understood that this is the only road by which the supply can be had, that there are inexhaustible beds of superior coal within half a mile of the road, and within eight miles of Alton, and that there is no pine lumber nor good coal along the line in the interior, it is undoubtedly safe to take one-half this amount as a correct estimate, which at 4 cents per mile per ton, (averaging 38 miles) would give a revenue of $22,800.

6th.—Taking the hotel registers of St. Louis, Alton and Springfield as a basis, it is proved that there are over thirty through passengers per day, between Springfield and the above cities; the completion of the road will certainly double this number. But taking the first estimate, 30 per day, at 3 cents per mile, will give an income of $53,466.

7th.—The way travel we estimate at the same amount, $53,640.

8th.—Mail, $100 per mile, $7,600.

RECAPITULATION.

Income from transportation of produce	$114,500
" " " " hogs	10,833
" " " " cattle	10,000
" " " returning freight	47,500
" " " coal and lumber	22,800
Through passengers	53,640
Way do	53,640
Mail	7,600
Making the gross receipts	$320,513
Estimated cost of operating the road, one-half proceeds	160,386
	160,386

Over 16 per cent. on cost of road.

So much for an estimate of income from an actually existing business.

We find our own views of the extent and nature of the business on Western roads, and the estimates which we have given above, strikingly confirmed in a recent pamphlet, put forth by D. A. Neal, Esq., one of the corporators of the Illinois Central railroad, upon the prospective business and income from that great work. As Mr. Neal is admitted to be the very highest authority in reference to all matters touching said roads, we propose to compare, as far as may be done, his estimates, with those which we have prepared in reference to the Alton and Sangamon railroad, as far as a parallel between the two holds good.

The *first* item in Mr. Neal's estimate of the business of the Central railroad, embraces the articles of wood and coal. As our estimates fall below his, we keep our figures of revenue from these sources, viz., $22,800.

2nd. The second item in his estimate is "the produce of the soil." Upon this he says:

"The second source indicated, from which the capital is to be sustained is 'the produce of the soil.' The transportation of Indian corn and other grain *will be the important business of the road.* Their production will in time be limited by the capacity of the road to carry it off. In an estimate of this sort then, it may be safe to neglect all other kinds of produce, or rather consider them as merged into the one article of maize or Indian corn. We have already restricted ourselves to a population in the district of country lying within fifteen miles of the railroad to the density of the whole State by the census of 1850, or fifteen to the square mile. There will be, as before stated, 20,000 of such miles, and the number will of course be 300,000. A large portion of these will be male adults; but taking the usual calculation of five to a family, we have 60,000 families. Deducting again one sixth for other employments, we have then 50,000 families presumed to be in the cultivation of the soil. Now it cannot be doubted, I think, that ten families can easily till and take care of 1000 acres of Indian corn in Illinois by an interchange of labor. It is as certain that the land will give 50, 60 or 70 bushels to the acre. This gives an average of 100 acres of cultivated ground, and 6,000 bushels of corn to each family. But to be sure not to overtask the powers of the people, or of the soil, we reduce both one-half, 50 acres and 30 bushels per acre, giving to each family 1,500 bushels. Of this suppose one-third to be used in the family and on the farm and wasted. There remains 1,000 bushels. As a portion of this may be represented by less bulky and more valuable articles, we again reduce it one-third, to get at the weight that will require transportation to a market. This leaves us 666⅔ bushels of corn, or an equivalent in other things, and which multiplied by the number of families gives equal to 33,333,000 bushels of Indian corn. The usual mode is to estimate 33 bushels to the ton. At 33⅓ it gives 1,000,000 tons. The distance which it would have to be transported to market could not be less than 100 miles, and the price would be low at five cents per ton per mile. This would give $4,000,000."

Making the application with the substitution of 22 inhabitants to the square mile, instead of 15, (which under the census of 1850 we find to the square mile along the line of the Alton and Springfield railroad) and we have the following result.—Length of road 76 miles. Number of square miles within 15 miles of the road, 2280; population 50,160,—farmers engaged in cultivation of the soil, 8,360; corn produced, 12,540,000 bushels; estimated amount of corn, or its equivalent to pass on the road, 5,573,333 bushels;—or, 666⅔ to the family, and amounting to 167,535 tons, which at four cents per ton per mile, averaging the transportation at one half the length of the road, 38 miles, at $1 52 per ton, will yield a revenue of $254,653 20, more than double our estimate.

3d. The third item is the return of freight exclusive of coal and lumber, in relation to which Mr. Neal remarks:

"The returns that will be made to the producer of this large amount of property must bear some proportion to it in value and in bulk. If the corn nets but fifteen cents per bushel, it will give to each family $100, and to the 30,000 families $5,000,000. To keep within bounds we will suppose that exclusive of the lumber by the coal and other trains, only one-eighth of the outward tonnage is returned in supplies. This would give the road at the enhanced rate which such goods would bear, (say five cents per ton per mile) or $5 per ton, $625,000. Applying a similar estimate to the Alton and Sangamon railroad, and we should have 20,941 tons, at five cents per mile per ton, averaging to be carried 38 miles, which at $1 90 per ton, would give a revenue of $39,787 90."

4th. The fourth item is local travel, concerning which the following language is used:

"The local travel of the same population will be an item of some importance. They must be considerably scattered, and if they associate at all, they will use the road. Each head of a family averages five journeys of 60 miles each, or 300 miles per annum for the whole household. It will cause the road to carry one passenger 18,000,000 miles, which at three cents per mile is $540,000. This would amount to nine dollars for each family per annum. If we reduce it one-half, there can be little doubt of the other half being made up and more than made up by the other local passenger and freight business, such as those living without the line of twelve miles, of citizens of other States visiting the stations, and the thousand occasions for trips from the termini to the interior." It seems safe then to let this item stand; applying this estimate to the 8,360 families on the line of Sangamon and Morgan railroad, and we have a revenue of $75,240 from this source.

5th. The fifth item has reference to the through travel which must depend upon so many conditions differing from those which belong to the Central road, that we have thought it best to retain our own estimates of 30 through passengers each way per day, which at three cents per mile will give $53,640.

Mail 76 miles $7,600, and we have the following recapitulation:

Freight of coal and lumber	22,800 00	
Freight of produce of the soil	254,653 20	
Freight returning	39,787 90	
Local travel	75,240 00	
Through do	53,640 00	
Mail	7,600 00	
		$453,721 10
Less expenses 50 per cent		226,860 55
		$226,860 55

—over 22 per cent on the cost of the road.

Or if we take the above	453,721 10
And deduct all the items not strictly calculated according to Mr. Neal's basis, to wit, items 1 and 5	76,440 00
We have still left	377,281 10
Less expenses 50 per cent	188,640 55
Leaving over 18 per cent profit	188,640 55

We have been particular to give Mr. Neal's estimates, for the reason that he is connected with the greatest railroad project now occupying the attention of our people, and exerts a strong influence in the direction of its affairs. His estimates are undoubtedly prepared with the greatest caution, and upon the most careful investigation, and deserve additional consideration from his justly celebrated reputation, of being one of our ablest and most successful railroad men. He gives them as his own conviction, of what will be the results of the Central railroad, upon a given state of facts. If they will prove true of the Central, they will equally so, of most of our western roads. They are certainly applicable in their fullest extent to the Alton and Sangamon railroad, as the country traversed by this is richer, more densely populated, produces more to the acre, and is probably more fertile than the country traversed by the Central road.

We have thus far spoken only of the local business of the Alton and Sangamon railroad. We may here add one or two general remarks in reference to the comparative amount of freights upon eastern and western roads:—1st. That all articles of western export are of a bulky kind, and pay a large profit in proportion to their value; and, 2nd, that agriculture being the leading pursuit in that quarter, all surplus raised is exported to distant markets, and must pass over railroads when constructed; that for the want of manufacturing establishments, nearly every article of consumption that the farm does not produce, is imported from abroad, or from the other States. This state of things necessarily causes a much larger amount of transportation, than in the older States, where the greater variety of pursuits enables every person to supply most of his wants from the industry of his own neighborhood. The necessary interchange here is effected without going beyond the circuit of a few miles.

What will be the through travel and business of this road? We may set it down as a fixed fact that the *Central* road will be completed at an early day. Bloomington, a town about sixty miles northwest from Springfield, is to be a point in this road. From the latter place, active measures are in progress for the construction of a railroad to the former. This road will undoubtedly be in readiness as soon as the Central road is opened to the lake. A line drawn from Chicago to St. Louis would very nearly pass through the three towns of Alton, Springfield and Bloomington. A road through these intermediate places will constitute the shortest practicable line between the two great cities of Illinois and Missouri. Travellers from the north wishing to reach St. Louis on the Mississippi, would leave the Central road at Bloomington.—The Alton and Sangamon railroad must, therefore, for aught we can see, forever constitute the lower and most profitable part of the *main trunk line*, between Lake Michigan and Springfield, Alton and St. Louis. The latter, we believe, is the great city of the west. In a commercial point of view, the south shore of Lake Michigan is one of the most important points in the United States. It is the ultimate of Lake navigation, and around it sweep all our northern lines of railroad, running east and west. The through travel must equal, if it does not greatly exceed the local. We think that no one who will examine a map of Illinois, with the line of railroad in progress, can fail to come to similar canclusions.

The same general conclusions apply with equal force to the transportation of freight. In a good stage of water, the majority of the heavy freight will follow the canal and the Illinois river. But even at such periods the more valuable and perishable articles will go by railroad. The same causes which constitute the above the route of travel, will make it the route for freight. When the river is not navigable, from low water or ice, the amount of freight thrown upon this road must be very large. A great part of the West will receive their foreign supplies through Chicago from the low cost of carriage between that city and New York. These goods will be distributed over the country chiefly through railroad, and from the certainty and speed of transportation, St. Louis and Alton will at all times receive no small portion of their merchandize over the above road. We think that no person, carefully examining this subject can come to any other conclusion.

We have thus at some length pointed out the claims of the above road to the public consideration. As far as our remarks have a general character, they are applicable to all western projects.—Nearly all western roads promise to *pay* very liberally on their cost.

But there, as at the East, there is of course great difference as to the capacity of different lines for business. Those that are identical with the great routes of travel must pay much better than those which are thrown entirely upon local traffic for support.

We are glad to learn that the above road is making good progress towards Springfield. Already the rails have been laid upon eleven miles of the track. Twenty-eight miles additional are already graded and ready to receive the superstructure, and the iron and ties for the distance to Carlinville, are already delivered at Alton. The whole road to Springfield is to be completed during the ensuing year.

Copper Harbor Mines.

About sixty miles to the northwest of the Iron Mountains of Carp river, lies the great range of copper mines for which the shore of Lake Superior is so distinguished. About sixteen miles westerly from Keweenaw Point, lies Copper Harbor, a beautiful bay cut out of the dark, rock-bound coast, and forming one of the most secure and commodious harbors on the Lake. This was the point where the first commencement of copper mining was made in 1843 or '44; things went on well for two or three years, when from some unknown cause, the mines, one after another, dropped off work; stores and public houses had to close for want of customers; and finally, from the fall of 1847 to the spring of 1850, Copper Harbor was literally a "deserted village."

Last season, however, explorations were again commenced, new mines were discovered and opened in the neighborhood, a few interested persons returned to their old homes, and the place began to revive as from a deep slumber. At the present time, the place has resumed quite an active, business like appearance.

The present miners have entered on their labors under far more favorable circumstances than those under which these mines were originally commenced, having had the advantage of years of study and experience, and aided by the discoveries in practical mining in various parts of the world. We will give a slight sketch of the various works now in progress in the vicinity of Copper Harbor.

The New York and Michigan mining company have recently commenced work on the location, six miles from the Harbor, formerly worked by the same company. The superintendance of the mining business has been given to Mr. Sampson Vivian, a gentleman of experience from Cornwall. At present ten miners and surface men are employed. The old work consists of a shaft sunk about sixty feet; this has been drained and ventilated, and a few feet further sunk. The vein is described as well defined, and about two feet thick in the drift at the bottom of the shaft, composed of phrenite and calcareous spar, and dipping to the west one foot in six.

A short distance to the west of the last named company, a new company called the Star Mining company have just commenced work under the charge of Mr. John Stearns. They are making preparations, in hopes to be able to commence mining early in the fall.

Two miles further westward, being three and a half from Copper Harbor, are the works of the Cape Mining Association. Operations were commenced here about a year ago, under the superintendance of D. D. Brockway, Esq. Mr. B. is sinking two shafts, one hundred and sixty-one feet apart, on a remarkably wide and beautiful vein, and has run an adit level one hundred and ninety feet in length.

Half a mile further to the westward is the Avery mines, the working of which will probably be commenced early in the fall. An acre or two of ground has been cleared and planted with potatoes.

A mile further west is the Iron City Mine, under the superintendance of Simon Mendlebaum, Esq. This mine is about five miles from Copper Harbor, to which place there is a passable road. Operations were commenced here about a year ago, during which time rapid progress has been made.—Twe shafts have been sunk, one to the depth of one hundred and thirty-three feet, the other eighty-two feet. A ten fathom level has been driven two hundred and seventy-five feet between the shafts, extending north one hundred and ninety-five feet, and south sixty-three feet. A second level has been commenced and extended some fifteen or twenty feet. The product of ore is very gratifying. At present sixteen miners and six surface men are employed; they have five comfortable houses, and six or eight acres of good land cleared, and will raise a large quantity of potatoes this season.

A short distance from the last mentioned mine, a new company called the Bluff, have just commenced operations; T. P. Harrington is agent of the company, and there appears to be a flattering prospect of a good vein.

Two and a half miles westward of the Bluff, operations have been recently commenced at what is called the Medora Mine. Robert Reed, Esq., has the superintendance of the works, and is sinking two shafts on a well defined vein, one hundred and ninety feet apart. The first is down over eighty feet, and the other forty-five feet. Eight miners and nine surface men are here employed; two acres of land are cleared and planted to potatoes.

The above we believe, are all the principal works in progress in Copper Harbor district; and from the enterprise and energy of the gentlemen engaged, we may confidently expect some rich developements in this interesting region very soon.

Virginia.

The Northwestern Virginia railroad company was organized at Parkersburg on the 2d instant, by the election of James Cook, President; and George Neal, Jr., Joseph Spencer, J. M. Bennett, Wm. Logan and Jefferson Gibbons, Directors. Mr. Latrobe, it is understood, will be appointed Chief Engineer of the company and undertake the location immediately. The Parkersburg, Va., Gazette of Saturday last, says:—

Great unanimity characterized these elections, the above named gentlemen receiving the votes of full four-fifths of the stock. We congratulate the company and the community upon this choice. Mr. Cook possesses sterling business qualifications and will prove a prompt and energetic, yet prudent President; while those associated with him as directors, are thorough-going and practical men, whose advice and counsel would be safe guides to any officer.

We learn that the president and directors have appointed Benj. H. Latrobe, Esq., of Baltimore, Chief Engineer of the company, and P. G. Van Winkle, Esq., Secretary to the board, requesting the first to commence his surveys forthwith. Better appointments could not have been made, and, in

this first step, the board gives earnest of its most able and direct management. Mr. Van Winkle we are told, has accepted his appointment—at least for the present.

Indiana.

Bellefontaine and Indiana Railroad.—From a recent exhibit of the affairs of this company, we learn that the whole line of 118 1-5 miles is now in the hands of contractors. The grading and masonry on the first 20 miles, from Galion to Marion, is now about completed; the grading and masonry on the 33 miles between Bellefontaine and Loramie Creek, at the crossing of the Miami Extension canal, will be finished by the first day of October next. More than half the work on the line is now done. The intention is to prepare the 20 miles from Galion to Marion for use the ensuing fall.—The 33 miles from Bellefontaine to Sidney about the same time, or early in the spring; and the remainder of the line by the fall of 1852.

The road is to be laid with T rail, weighing 60 pounds to the yard, laid on cross ties set two feet from centre to centre. Mr. Roberts, the chief engineer, estimates the cost of the road, including engineering and contingencies, as follows:

Graduation and masonry, 118 1-5 miles, at $4,000	$472,800
Graduation and masonry 5 miles double track, at $2,000	10,000
Railway superstructure 118 1-5 miles, at $7,900	933,780
Railway superstructure 5 miles sidings, at $7,900	39,500
Right of way	12,600
	$1,468,680
Equal to $11,721 10 per mile.	
Add estimated cost of water stations, shelter for passengers, etc	30,000
Add estimated cost of locomotives and cars for the probable business of the road	150,000
	$1,648,680

Equal to about $13,400 per mile.

The resources of the company are as follows:

Subscriptions of capital stock in Ohio	$850,000
To be raised by sale of bonds, secured by morgage of the road, fixtures, depot grounds and equipments	800,000
	$1,650,000

These mortgage bonds are now for sale in this city by Messrs. Winslow, Lanier & Co., No. 52 Wall street.

The following is the minimum business of the road, as estimated by W. Milnor Roberts, chief engineer.

75 through passengers per day each way at $3.	$450
100 way passengers per day each way, calculating half the distance, at $1 50	300
100 tons through freight each way per day, at $3 60	720
100 tons way freight each way half the distance, at $1 80	360
Transportation of mails and sundries	50
Total per day	1,880
Deduct 40 per cent for repairs and expenses	752
Leaves net daily profits	$1,128

The last sum multiplied by 313, the number of working days in a year, makes $353,064—being about 20 per cent on $1,648,680, the estimated cost of the road with equipments ample for such a business.

Of the situation of this road, on a direct line between the city of St. Louis and Dunkirk, the western terminus of the Erie road, and being one link of the great chain of railway communication between the valley of the Mississippi and the Atlantic coast, we have spoken heretofore. We have often spoken of the importance of this road, both in reference to its local trade, and in its connection with other lines. It will be constructed at the minimum cost of western roads, and offers a most profitable investment for capital, not only in its bonds, but its stock.

American Railroad Journal.

Saturday, August 23, 1851.

The Gauge.

We give in another column the report of Jas. P. Kirkwood, Esq., Chief Engineer of the Pacific railroad, upon the gauge of that road. As this is the first project of the kind of any magnitude, west of the Mississippi, and as that river is a bar to a continuity of track with the eastern roads, the question of gauge was entirely an open one, and could there be treated upon its abstract merits.—Mr. Kirkwood favors the 5½ gauge. We are happy to place before his professional brethren the reasons that led him to this conclusion, as we feel sure they merit careful attention.

Philadelphia and Baltimore.

We give this week the Philadelphia side of the argument in reference to western connections, in reply to "Baltimore," which appeared in our paper of the 2d inst.

Corporate Subscriptions to Railroads.

The city of Alton, Illinois, has voted to subscribe $100,000 to the capital stock of the Alton and Terre Haute railroad.

The town of Somerset, Perry county, Ohio, has subscribed $23,000 to the Cincinnati and Zanesville railroad, and the township in which it is situated voted $20,000 more.

The counties of Buchanan and Marion, Missouri, have each subscribed $100,000 to the Hannibal and St. Joseph's railroad.

The city of Middletown, Conn., has subscribed $200,000 to the Air-line railroad.

The county of Summit, Ohio, has subscribed $75,000 toward aiding to complete the Akron branch railroad to Millersburgh, and from thence south to intersect the Indiana and Ohio railroad at Coshocton.

Indiana.

Lawrenceburgh and Upper Mississippi Raitroad.—A meeting of the citizens of Indianapolis friendly to the construction of this road, was held on the 9th inst. W. Sullivan presided, and the meeting was addressed by Hon. G. H. Dunn, president of the road. He stated that the road from Indianapolis by way of Shelbyville, Greensburgh and Lawrenceburgh, was the nearest, the cheapest and the best route direct to Cincinnati, and he thought the road was in a fair way of completion to Shelbyville by the fall of 1852.

The iron for the first division of the road was expected to arrive in a few weeks, and would be immediately laid down. 1,700 tons heavy T patent, weighing 60 pounds to the yard, had been purchased, and was on its way. The work was all let to Shelbyville, 63 miles, and was to be completed so as to receive the superstructure next season.

The distance from Lawrenceburgh to Indianapolis is 90 miles, and the entire cost, including debts, engines and rolling stock sufficient to work it, $1,050,000. The amount of stock already taken is over $400,000, and $100,000 additional stock would enable the company to complete the grade to Indianapolis. Mr. D. believed that Cincinnati would help if it became necessary. Cincinnati, he said, was not ignorant of the efforts making by Louisville to draw to her the trade of Indiana by means of the Jeffersonville and New Albany railroad, and she would be ready to meet the work at Lawrenceburgh by the time it reached there.

The Indiana State Journal expresses the opinion that from the spirit manifested at the meeting, the nature of the resolutions adopted, and the ability of the men who have so earnestly taken hold of the matter, the pecuniary aid desired will be given by Indianapolis in behalf of this enterprise.

New York.

A railway has been projected from Watertown to Potsdam in St. Lawrence county. The distance is about 63 miles, through a fine country.

There is some talk about a railroad to connect Syracuse with the Rome and Watertown railroad in Pulaski. The distance is about 30 miles, and the route is said to be favorable.

It is asserted with much confidence that the Rome and Watertown railroad will be extended to Cape Vincent. At that point it will form a connection by a ferry across the St. Lawrence, with the great Nova Scotia and Canada railroad, extending from Halifax to Detroit. This continuation renders it a matter of some importance to Syracuse to secure a direct railway communication with Watertown and the St. Lawrence, and we presume their enterprising citizens will not suffer this opportunity to go unimproved.

New York.

Buffalo and Conhocton Railroad.—This enterprise is making rapid progress. The first 45 miles is ready for the superstructure, and will probably be in running order this fall. The directors have purchased four first class locomotives, four first class passenger cars and one hundred freight cars. They are now receiving proposals for the work and materials upon fifty-five miles more of the road, extending from the north line of Steuben county to he village of Batavia. Proposals will be received until the 26th of this month at the office of the engineer, at Avon.

This road starts at Corning, and passes through Bath, Springwater, Conesus, Livonia, Avon, Caledonia, and Le Roy, and connects with the Central line at Batavia.

The citizens of Rochester, foreseeing how much of their trade is likely to be diverted into this new channel, are taking strenuous measures of self-preservation by urging forward the Genesee Valley railroad. Thus one enterprise stimulates another, and the competition excited communicates a healthful activity to all branches of industry and commerce.

Stock and Money Market.

The money market remains without much alteration. Money continues scarce, and commands high rates, but indications favor the idea that we have seen the worst, and that there will be a gradual amelioration, till the market is easy again.—Conjecture, however, is worth nothing; the fact only concerns our readers.

Bonds of new works sell with difficulty. Companies will do well to keep out of the market. Offering their securities at the present time only increases the evil. Quotations of bonds of roads in progress are merely nominal.

The new canal certificates have been taken at a premium, which ensures the immediate commencement of the work of enlargement.

Advices from Panama are favorable. Our great hopes at the present time are in remittances of gold from California. It is stated that there are $2,250,000 at Panama, and it is also stated that the receipts at the United States Mint for the present month will exceed $4,000,000.

The foreign rail market rules low. The present stringency will probably have the effect to check sellers.

The Evening Journal gives the annexed statement of the quantity of flour, wheat, corn and barley, left at tide water during the 2d week in August in the years 1850 and 1851, as follows:

	Flour. bbls.	Wheat. bush.	Corn. bush.	Barley bush.
1850....	55,461	42,412	175,881	5,376
1851....	76,357	87,650	321,848	.....
Increase.	20,896	45,238	145,967	5,376

The aggregate quantity of the same articles left at tide water from the commencement of navigation to the 14th August, inclusive, during the years 1850 and 1851, is as follows:

	Flour. bbls.	Wheat. bush.	Corn. bush.	Barley. bush.
1850...	980,386	440,901	2,203,726	136,953
1851...	1,648,183	1,105,765	4,815,544	114,385
Inc....	667,797	664,864	2,611,818	dec. 22,568

The aggregate quantity of the same articles left at tide water from the commencement of navigation to the 14th August, inclusive, during the years 1849 and 1851, is as follows:

	Flour. bbls.	Wheat. bush.	Corn. bush.	Barley. bush.
1849....	1,217,871	761,008	3,436,948	100,430
1851....	1,648,183	1,105,765	4,815,544	114,385
Increase.	430,312	344,757	1,378,596	13,955

By reducing the wheat to flour, the quantity of the latter left at tide water this year, compared with the corresponding period of last year, shows an increase of 800,769 bbls. of flour.

The amount received for tolls on all the New York state canals during the second week in August is $93,804 18
Same period in 1850 ..... 83,485 20

Increase in 1851 ..... $10 318 98

The aggregate amount received for tolls from the commencement of navigation to the 14th of August, inclusive, is $1,702,222 34
Same period in 1850 ..... 1,408,361 31

Increase in 1851 ..... $293,861 03

The following is a statement of the amount of duties collected at the principal ports for the year ending June 30, 1851:—

New York ..	$31,756,199	St. Louis	$213,832
Boston	6,577,540	Cincinnati	105,191
Philadelphia..	3,667,838	New Haven...	102,130
Baltimore.....	1,047,278	Mobile.....	76,184
New Orleans..	2,296,636	Louisville	66 572
Charleston ...	600,712	Oswego	91,557
Portland	209.030	Richmond	70,235
Savannah.....	208,994		

Baltimore and Ohio Railroad.—The following are memoranda of the business of the Baltimore and Ohio railroad for the month of July, 1851:—

	Passengers.	Freight.
Main stem	$29,036 10	$65.912 07
Washington branch....	20,737 52	3,377 67
	$49,773 62	$69,289 74

Making an aggregate of $94,948 17 on the main stem, and $24,115 19 on the Washington branch—the total being $119,063 36.

The above, compared with the corresponding month of last year, shows an increase of $712 82 on the main stem, and a decrease of $3,113 90 on the Washington branch.

The receipts of the Vermont and Massachusetts railroad for the month of July, were.... $18,645 30
Same month last year 16,006 27

The freight connection of the Valley road with the Northern line being incomplete, very little benefit has been derived from that line as yet, which was opened for travel on the last of June.

The receipts on the Norwich and Worcester railroad for July, were $24,908 10
For July, 1850, they were 23,922 83

Increase $985 27

The earnings of the Michigan Southern railroad for July, were $20,712 40
For July, 1850, they were 7,667 69
Increase $13,044 71

The total earnings from January 1st, to 31st July of the present year, have been $133,486 86
For the same period last year they were, 43,375 24

Increase $90,111 62

The business of the Galena and Chicago railroad is in a flourishing condition. The receipts for the last three months are as follows:—

	1851.	1850.	Increase.
May	$14,338 23	$10,644 06	$3,724 17
June	16,627 68	9,748 93	6.874 75
July	16,650 67	9,335 25	7,315 42
Total....	$47,616 58	$20,798 24	$17,918 34

Railway Share & Stock List;

CORRECTED WEEKLY FOR THE

AMERICAN RAILROAD JOURNAL.

NEW YORK AUGUST 23, 1851.

GOVERNMENT AND STATE SECURITIES.

U. S. 5's, 1853	100¼
U. S. 6's, 1856	105¼
U. S. 6's, 1862	110
U. S. 6's, 1862—coupon	113a114
U. S. 6's, 1867	114¾
U. S. 6's, 1868	116⅝
U. S. 6's, 1868—coupon	121¼
Land Warrants	140a145
Arkansas 6's	52a53
Alabama 5's	91a92
Indiana 5's	79a80
Illinois 6's, 1870	65a68
Kentucky 6's, 1871	105a106
Massachusetts sterling 5's	105a106
Massachusetts 5's, 1859	100½
Maine 6's, 1855	103
Maryland 6's	102½
Michigan	—
Mississippi	—
New York 6's, 1865	117a118
Ohio 6's, 1860	108
Pennsylvania 5's	89

RAILROAD BONDS.

Atlantic and St. Lawrence, 6 per cent	85
Baltimore and Ohio, 1867	94½
Boston and Providence 6's, 1855	101
Boston and Worcester 6's, 1855, convertible	107½
Bost., Concord and Mont. 6's, 1860, mortgage	87½
Cheshire 6's, 1860	91½
Connecticut River 6's, convertible	98
Erie 7's, 1859	101
Erie 7's, 1868	107½
Erie income 7's	91
Hudson River 7's, 1853	101½
Michigan Central, convertible, 8's, 1856	104½
New York and New Haven	100½
Norwich and Worcester, mortgage, 1860	80a85
Old Colony, 1854	97½
Ogdensburg 7's, 1859	94a95
Portsmouth and Concord	80a85
Passumpsic 6's, 1859	94½
Rutland 7's, 1863	97
Reading mortgage, 1860	80
" " 1870	75
Sullivan, mortgage 6's, 1855	80
Vermont Central 6's, 1852	96½
" " 6's, 1856	91½
Vermont and Massachusetts 6's, 1855	86½

RAILROAD STOCKS.

[CORRECTED FOR WEDNESDAY OF EACH WEEK.]

	Aug. 20.	Aug. 13.
Albany and Schenectady	96½	—
Atlantic and St. Lawrence	60a65	—
Androscoggin and Kennebec	30a35	—
Boston and Maine	103	103
Boston and Lowell	108½	109
Boston and Worcester	100¾	101½
Boston and Providence	84½	85½
Bost., Concord and Montreal	40	—
Baltimore and Ohio	71¾	—
Baltimore and Susquehanna	36	—
Cheshire	53	—
Cleveland and Columbus	—	—
Columbus and Xenia	—	—
Camden and Amboy	—	—
Connecticut River	60	—
Delaware and Hudson (canal)	—	—
Eastern	95	96
Erie	70½	69
Fall River	92½	91½
Fitchburgh	108½	109½
Georgia	—	—
Georgia Central	—	—
Harlem	68	68½
Hartford and New Haven	124	—
Housatonic (preferred)	52	—
Hudson River	70	—
Kennebec and Portland	50a55	—
Little Miami	—	—
Long Island	15	14½
Mad River	—	—
Madison and Indianapolis	96	—
Michigan Central	104	103½
Montgomery and West Point	—	—
Michigan Southern	—	—
Manchester and Lawrence	97	89
Morris (canal)	14½	15½
New York and New Haven	101	—
New Jersey	133	—
Northern	66	66½
Nashua and Lowell	107½	—
New Bedford and Taunton	111	—
Norwich and Worcester	50	48
Norfolk County	22a23	—
Ogdensburgh	30	31½
Old Colony	65	66
Passumpsic	80	—
Pennsylvania	—	—
Pittsfield and North Adams	95	—
Philadelphia, Wilm'gton & Balt.	28	29
Petersburg	—	—
Richmond and Fredericksburg	—	—
Richmond and Petersburg	—	—
Reading	52	51
Rochester and Syracuse	105	106
Rutland	53	47
Stonington	43½	41
South Carolina	—	—
Syracuse and Utica	130	—
Sullivan	25	—
Taunton Branch	108	—
Troy and Greenbush	90	—
Tonawanda	—	—
Utica and Schenectady	130	—
Vermont and Canada	103	—
Vermont Central	30	30
Vermont and Massachusetts	25½	25½
Virginia Central	—	—
Western	102½	103
Wilmington and Raleigh	—	—
York and Cumberland (Pa.)	20	—

Memphis and Charleston Railroad.

Gov. Jones will start on in a few days to purchase the iron for the first fifty miles of the road.

The contracts for the cross-ties as far as La Grange, have been already let out, and the President of the board of directors expects to complete those for the grading in a few days.

With everything in so promising a condition; with a president and board of directors who display so much energy, ability, and unflagging industry; with a wealthy and powerful company of stockholders, ready, willing, and even anxious, to pay up the calls as they fall due, is it too much to expect that the road as far as La Grange will be ready for the transportation of the crop of 1852, and that the whole road will be completed and the cars running through to Charleston in 1854?—*Memphis Eagle.*

Connecticut.

Connecticut and Passumpsic Railroad.—From the sixth annual report of the operations of this company, we gather the following facts:—

The balance of last year's surplus was.		$3,556 31
Receipts of year ending May 31, 1851.		
Fassengers	$64,101 67	
Preight	80,374 69	
Other sources	5,106 75	
		149,583 11
		$153,139 42
Expenses		65,458 19
Nett earnings		$87,681 23
From this deduct 2 dividends 3 per cent each	65,541 00	
Interest on Bonds	13,860 00	
		79,401 00
		$8,280 23
Appropriated for special damages by freshet		6,420 99
Balance of Contingent fund		$1,859 24

The Treasurer's Trial Balance, which is published with the report, shows assets as follows:

Construction or amount expended for the road		$1,670,113 29
New cars and engines		31,573 20
Cash on hand		20,222 88
Materials on hand, and balances due from Station Agents		26,281 72
		$1,748,191 09
The Liabilities are—		
Capital Stack paid in		$1,094,670 55
Bonds negotiated at par, (amount received for)		501,115 00
Contingent fund		1,858 24
Dividend payable July 1		32,832 00
Notes payable		117,715 30
		$1,748,191 09
The construction of the road to Wells River cost		$1,149,626 77
The construction from Wells River to St. Johnsbury		518,262 73
New cars and engines		31,573 20
		$1,699,462 70
Less 15 shares to be credited when sold		1,500 00
		$1,697,962 70
The construction funds are 10,944 shares fully paid	$1,094,400 00	
Amount paid on 47 shares	270 55	
Amount due on 47 shares	4,429 45	
Bonds	550,000 00	
		$1,649,100 00
Balance to be provided for after collecting of delinquent Stockholders.		$48,862 70
The 47 delinquent shares are mostly set to single share subscribers, who have paid but $5. The delinquency		4,439 45
Added, shows a liability or floating debt unprovided for of		$53,292 15

The report states that the road has been thoroughly built, and the embankments are believed to be well protected against the action of the river freshets. But a further expenditure should be made of some $10,000 to $15,000 tor covering the bridges across the Passumpsic, rubbling around their abutments, finishing the slopes and ditches in deep cuts, enlarging the engine house, &c.

The opening of the Vermont Valley railroad from Bellows Falls to Brattleboro', completes the last link in the valley of Connecticut river, and opens a direct railway communication from St. Johnsbury to Springfield, New Haven and New York, and joint arrangements have been made for ticketing through passengers.

The Passumpsic railroad, while it always affords the best avenue from north-eastern Vermont to Boston and the towns on the Merrimac, constitutes the *only* route which can ever exist connecting with the lower valley of the Connecticut, and the city of New York. This last consideration alone ensures the future prosperity of the road.

The annual meeting of the company, at which this report was presented, was held at St. Johnsbury, Vt., on the 29th ult. A resolution was adopted to extend the road north to Barton or Derby as soon as the amount of stock necessary should be subscribed for at par, payable in cash. This action is in accordance with the fixed policy of the company which has never issued stock or bonds at less than their face, and never paid a dollar of extra interest.

The nett earnings of this road for the month of June last, were $11,722, against $7,449 of same month last year, and the earnings for July, up to 26th inclusive, were $14,431, against $9,639 last year. The earnings for the whole month of July would reach $16,000. The increase in the expenses bears no sort of comparison with the above.

Indiana.

Indiana Central Railroad.—The location of this road has been completed, the line to begin at that point of the state line between Indiana and Ohio, where the Dayton and Western railroad (of which it is a continuation) terminates. That road is expected to be in operation by April next. From that point the line runs very nearly straight the whole distance to Indianapolis, passing through Richmond, Centreville, Dublin, Knightstown, Greenfield, &c., being one of the most densely populated sections of Indiana. The whole length of the road is about 72 miles, of which less than four miles are curves. The highest grade at any one point is 58 feet to the mile. The engineer, H. C. Moore, Esq., estimates the whole cost of the road, with the necessary equipments for running the same, "constructed in the most substantial manner, so as to make it a first class road in every respect," with a T rail weighing 60 lbs. to the yard, laid upon white or burr cross-ties, ballasted with gravel a foot deep and ten feet wide, at $1,002,893.90, or at the average of $13,993.22 per mile. This includes depots, shops, water-stations, one fourth cost of Union track and passenger depot in Indianapolis, and 4½ miles of side tracks.

The division of the road between Greenfield and Knightstown, at the latter of which places it intersects the Knightstown and Shelbyville railroad, is in the hands of contractors, and will be graded this fall.

The engineer estimates that the probable business of the road will pay 15 per cent. dividends upon its cost, as soon as the work shall be in operation.

The officers for the present year are:—John S. Newman, Esq., President; John M. Commons, Secretary; Norris Jones, Treasurer; Henry C. Moore, Engineer; A. C. Blanchard, Jas. R. Mendenhall, John S. Newman, Norris Jones, David Commons, Thos. Tyner, William Petty, William Butler, John T. White, James P. Foley, Nathan Crawford, Orlando Crane, and Samuel Hannah, directors.

Pacific Railroad.

We gave not long since an abstract of the late report of the directors of this road. We now give an abstract of some portions of the report of the Chief Engineer, reserving the balance of it for our next paper. From St. Louis to the west line of the state reconnoisances have been made of *five* routes, three of which make Jefferson city and Georgetown a common point, and two by way of Versailles. The three routes to Jefferson city are distinguished as the Merrimac, the Union ridge, and the Missouri river route. The two routes by way of Versailles adopt the Merrimac and Union routes from St. Louis.

The comparative length and cost of these different routes, are as follows:—

	Length.	Total cost.
Merrimac route via Jefferson & Georgetown	317.68	$6,743,181
Union Ridge route, do. do.	311.62	6,169,515
Missouri River route, do. do.	240.52	5,980,084
Merrimac route, do. Versailles,	317.86	6,785,007
Union Ridge, do. do	312.11	6,626,101

From the surveys it appears that not only is the mechanical advantage entirely in favor of the Missouri river route, when compared with the other routes, but the aggregate of cost is also in favor of that route.

But the choice of a route must in a great measure be influenced by another consideration, viz., the character of the traffic which it can command; and that route which will create the largest per centage of receipts in tonnage and travel, as compared with its cost, and which will develope to the greatest extent new resources, must prove on the whole the most valuable.

Between St. Louis and Jefferson city, two of the three routes surveyed, call for a comparison of this kind, to be properly understood. The Missouri river route passes, except in St. Louis county, through a more thickly settled country than the other, as the accommodation afforded by the river has concentrated the population there, and the bottom lands are very productive. The railroad would add much to the accommodation of this valley; and because it would form a better connection with St. Louis every day of the year, than the river does at any time, an impulse would be given to production which is but imperfectly felt now, and the river valley would undoubtedly fill up rapidly. The effect would also be felt in a less degree on the opposite side of the river from the railroad. The river being in many places a difficult stream to ferry, and during the winter months and the months of low water, the transmission of freight across it being scarcely possible, the railroad would have to depend for one third of the year on the bottom land on its own side of the river, and during the remainder, it must compete with the river transportation. Hereafter, when the country shall be more densely settled with an active and business population, the competition may be a more safe one. The Hudson river railroad competes encouragingly now, when but partly in operation, with the Hudson river, and is doing a large business. The New York and New Haven railroad competes successfully with the east river or Long Island Sound, which stands to it in the same relation as a navigable river. The railroads along the lake shores, now making, will not suffer very materially by the competition of the lakes. The rapidity of the transit on a railroad, and above all, the perfect regularity of its operations, renders its accommodations immeasurably superior to those of steamboats.

The competition of the Missouri river would be much less irksome than that of the Hudson. The navigation of the latter is remarkably safe and easy; that of the Missouri is at all times tedious, and for one third of the year intricate and dangerous.

The Merrimac river route, although longer, more costly, and less valuable, mechanically, than the Missouri river route, offers advantages in other respects which neutralize to a large extent its mechanical disadvantagas. This route touches the Missouri river at the mouth of the Osage, and thence follows the Missouri valley to Jefferson city. Between St. Louis and the Osage river, a distance of 140 miles, it is inland, and independent of the competition of the Missouri river. Hence the country tributary to it would be much wider than that which could be made tributary to the Missouri river route, and its freight charges would yield a fairer return, and produce a safer and more regular income. The land, wherever improved, shows a capability of producing good crops, and its convenient position to St. Louis would render it valuable, and would cause it to be rapidly occupied were a railroad present to carry off its surplus produce.

This route would pass through a portion of the Merrimac valley, which abounds in ores of iron, and it would pass sufficiently near to the lead mines on the Bourbeuse ridge, and to many of those in Washington county, to render their working very profitable. The cost of transportation of pig metal to St. Louis, when the roads are in good order, is about $5 87 per ton; when the roads are in bad order the cost is generally increased to $8 per ton. The cost of transportation by railroad, at fair rates, would be about $1 50 per ton.

This great saving in the carriage of materials, and the further advantage of being able to forward them to market, at all times of the season, with equal facility, would form inducements, it is believed, sufficient to lead to the erection of many new furnaces, both of lead and iron, and to bring into use much of the deposits of iron, hitherto unopened, which now form so much dead capital there.

The pig iron, used at the different iron works in the city of St. Louis, is estimated to amount to 15,000 tons during the year. This has heretofore been obtained principally from Ohio furnaces.

All the bar iron sold now in St. Louis is obtained from other States and from abroad. The amount of iron which will find sale by and bye, in St. Louis, for the supply of the surrounding country, will prove of itself a very considerable market.—The distance of St. Louis from the seaboard acts as a tariff of protection in its favor against foreign iron, to the extent of the cost of transportation from the coast. The iron furnaces in Ohio were mainly brought into existence by the facilities of canal transportation, created for their benefit and for the development of the other resources of that State. The same causes, viz: an easily accessible market and a fair profit, in great part due to that accessibility, will produce similar results for similar facilities, in the Merrimac valley. The lead mines, which are now worked in many places but superficially, will, under greater encouragements, be worked more carefully, and produce more abundantly. The establishments which grow up around iron furnaces and manufactories, employ a great number of persons, and afford a home market for all the farm produce of their neighborhood. They create a great deal of passenger travel for a railroad, and besides the tonnage which they send off, they receive considerable in merchandise for their own consumption. We can hardly overrate the importance to St. Louis and to the State, of affording the mineral region of the Merrimac such railroad facilities, as will place its extensive deposits of iron ores in a position to be available to capitalists.

The survey made by Major Morell, in 1840, for a railroad to the Iron Mountain, passed through a country very rich in lead ores, and where numerous furnaces are now at work on a small scale; the expense and difficulty of transportation, here, as in the Merrimac valley, cramping their operations. The length of road to be made from St. Louis to accommodate the above district of country, would be reduced upward of thirty miles by the construction of the Merrimac route. Such a road would connect with the Merrimac line opposite the mouth of Big River, and its entire tonnage would pass over that road for a distance of at least thirty miles.

A railroad from Springfield and the southwestern counties would, if it pursued the most direct course to St. Louis, connect probably with this route on the Merrimac ridge. Such a road would pass near the Merrimac iron works, and would accommodate the metallic deposits of lead, iron and copper on the Bourbeuse ridge and in the upper valley of the Merrimac.

At the Gasconade river, the Merrimac route would intercept a large part of the pine lumber which is now floating down the Gasconade and Missouri rivers to St. Louis. It would take all that was required for the upper country, and it would take much of what was intended for St. Louis, because the rafting of it on the Missouri river is attended with considerable loss. The Missouri river route would also take a portion of it at the mouth of the Gasconade: but a greater portion of the lumber intended for St. Louis, having got so far, would continue down the Missouri, than when intercepted higher up the Gasconade.

It seems plain, says the report, that although the Merrimac river route does not present the shortest and best route for a railroad from St. Louis to Jefferson City, the interests which it assists and develops are so important, and promise such results, as to make it questionable whether, compared with the Missouri river route, it would not afford the safest return as an investment in the event of Jefferson City continuing to be a point on the road.

The lower part of the Versailles route will accommodate and develope the same interests as the Merrimac river route. At the crossing of the Gasconade, it will intercept the lumber business of the yellow pine country to better advantage than either of the Jefferson city routes which cross that river lower down. At this point, or in this neighborhood, it will receive the iron tonnage of the Merrimack iron works. At the crossing of the Osage river, the freight floated down that stream would be received; and also a certain tonnage of coal, from the coal mine now working there. From the crossing of the Osage to the state line, the route passes over a rich and fertile prairie country. The whole of the upper portion of the state through which the railroad passes, is so far distant from the river as to render the transportation of any surplus produce there unprofitable, unless when prices are very high. As a consequence, but a small fraction of these lands is improved, and the raising of stock forms the chief resource of the farmer. The importance and advantage of a railroad to that section of country, must be instantly apparent to every one.

Railway furniture and Locomotives in the World's Fair.

The July number of the Westminster Review contains a very full and minute description of the railway furniture, locomotives, &c. in the Industrial Exhibition at the Crystal Palace. The following extract, will be of interest to our readers:—

In looking through this large sample of the work wrought by man in the process of winning the world from the wilderness—this emblem of growth since the time that aboriginal Britons painted their skins with "the juice of wood," the imagination is at first bewildered, and most persons find it needful to let many days elapse, wandering as through a newly discovered country, absorbing matters in thought. Nature, Art, and Utility all seem to struggle for notice and claim the first attention.—We commence with the utility as the basis of man's existence; and with that especial portion of utility without which this huge compendium of human civilization had not been possible. We allude to the means of transit on the large scale—railways and their appliances.

For, without railways, the uses of iron and glass in buildings had not been in such a state of progress; their manufacturers, without the large demand, could not have constructed the means of supply. Without railways, the mass of objects would scarcely have been transported to the scene of exhibition; and without railways, the mass of the world's denizens could not have been collected together to commence the era of human brotherhood, to show practically that God hath made all men of one blood,—to show the remarkable fact, that while almost all Europe is ruled, and kings and princes protected by soldiery, here in England the love of order practically suffices.

A long double line of rails, and engines and vehicles thereon, exhibit some of the old and many of the new arrangements.

The "permanent way" is of many kinds. There is the common cross sleeper road, with double T rails and cast iron chairs and wood keys and compressed trenails, on Ransome and May's plan; and here is the Great Western plan of the comparatively shallow, bridge rail, laid on a small balk of deal, seven inches deep, by fourteen inches wide, and solidly bolted to it with plates at the joints.—This mode of laying "permanent way" has enabled the huge machinery of the Great Western to travel with comparative safety. It is really an elastic railway, and the elasticity is continuous; but the waste of power must be very considerable, and the expense of maintenance is great. That the joints are not satisfactory may be gathered from a late experiment of welding or rivetting a rail together, a quarter of a mile in length, to get rid of the jolt in travelling. It is said that expansion and contraction produce no effect on this, but that the iron compresses,—a statement we incline to doubt. It is obvious that the uneven and loose joints of rails are a source of great destruction, expense of maintenance, expense in traction, and also a great source of risk; and the common plan of fastening on the Great Western has been far superior to the common plan of the narrow guage. But the ordinary double T rail of the narrow guage is very far superior to the bridge-rail of the Great Western, by its process of manufacture, and also by its better form for resisting vertical deflection. Adam's fish-joint, now used on many lines, and of which samples taken up from actual use are exhibited, was the first mode of remedying this evil. A pair of "finishing" plates, similar to the plan used by seamen for joining a broken yard or mast, are applied on each side of the rail, neatly fitting the side channel.

Four bolts pass through the whole from side to side. The holes in the rails being of larger diameter, the expansion and contraction are free, and the fishes fitting the rails only against the upper and lower lip, and having a hollow space where the bolts pass through, they are always on elastic tension, and never work loose. This plan has been found in practice to convert the rails into a continuous bar. In the use of these fishes, the joints of the rails are not made to bear on supports, but are suspended between them, being amply strong and all vibration is thus avoided. A small model shows a mode of combining this fished rail of the

narrow gauge with the longitudinal baulk-sleeper of the broad gauge. The timber is cut in two vertically, and the rail being grooved into it, the two timbers are bolted together by bolts from side to side beneath the rails, which are bedded to the upper lip. This fish joint has hitherto withstood the test of heavy traffic better than any other plan tried, and reduces the expense of "maintenance of way" to a mere fraction of what it was before the plan was tried.

Subsequently to the introduction of this fish-joint which was patented in 1847, Mr. Barlow of the South Eastern patented a system of cast iron-sleepers, on the alleged ground of advantage, that cast iron was not subject to decay like timber. These sleepers are longitudinal, but not continuous. They are cast in two halves, with three grooved heads to clip the lower lip of the rail, and being bolted together hold it like a vice. These cast sleepers being three feet in length, it is obvious that the two rail ends abutted together and thus bolted, would make a good joint, provided the iron fitted, and were sufficiently strong. A sample of this is shown.

Apparently doubtful of this, Mr. Barlow of Derby patented a similar plan of cast-iron sleepers, but in one piece, with three chair-heads, and wooden keys to keep the rails fast. A sample of this is also shown.

A third competitor then came into the field. Mr. Samuel of the Eastern Counties, planned and patented a kind of cast-iron trough, into which the rail was wedged between two pices of timber, grooved as first described. These cast-iron troughs thus formed a combination of Barlow's cast-iron sleeper and Adam's timber bending. But they are not continuous, and the fish joint is used with them instead of Barlow's cast-iron sleepers, making a combination of all three. This sample also may be seen as a specimen of two years' actual use. It is mechanically the best arrangement, where cast-iron is used, providing a timber cushion for the rail, which cannot be crushed away any more than the water can be crushed in a hydraulic press. But it would be a far better plan to make the troughs the whole length of the rail to prevent deflection at the intermediate spaces. Close beside these appears another sample of cast-iron sleepers, patented by Mr. Hoby. They are iron troughs, similar to those of Mr. Samuel, with the difference that the rails are retained in them, not by a wood bedding, but by folding wooden wedges.

The object sought by the Messrs. Barlow and Mr. Hoby is twofold: First, to obtain good connection of the two rail-ends by an elongated metal fastening, which is a practical variation of the plan of fishing patented by Mr. Adams. Secondly, to obtain durable sleepers. But whether the rigid cast-iron structure will be mechanically so advantageous as the combination of iron and timber, is problematic. So important is it now considered to obtain good joints, that Mr. Norris, of the North Western, has patented a plan to carry a moving furnace along the rails for casting a mass of iron round the joints, just as a plumber makes a lead-joint to a pipe.

Close by is a sample of the cast-iron sleepers patented by Mr. Greaves, called the dish-cover sleeper, from being of a hollow conical shape.—They are simply a chair cast on a truncated cone, and were merely intended, not to remedy a defective joint, but to attain chemical durability. They were produced at an earlier period than Mr. Barlow's, and too save cost in iron, were made to thin. A peculiarity about them is a hole in the top, through which to ram down the earth with a mallet or rammer, to raise them when driven down with the working of the trains.

None of these cast iron plans are original.—Some years previous, a Mr. Reynolds patented cast iron sleepers with wood linings, called, from their angular shape, the hog trough metals. They were tried on the Great Western and abandoned, but whether from inherent defects or from injudicious detail, we are not were.

The last novelty in rails exhibited, was patented by Mr. Barlow of Derby, and is called the saddle-back rail. It is a variation of the form of rail used by the Great Western, and resembles the pommel and two side-flaps of a riding-saddle, hollow beneath. The peculiarity of this rail is, that it is wholly independent of sleepers, and is supposed to be of sufficient surface, strength and weight, to maintain its position on the ground by the mere addition of tie-rods, connecting the two opposite rails together. The points of the rails are rivetted to a single fishing-plate, connecting each pair of rails together. This kind of rail is still in course of probation on the Midland line, and on the Great Western. It is described as being more noisy than the rails laid in cast iron; and we incline to think that vibration may produce some unexpected effects from it, from which the combination of wood and iron is free, of precisely the same kind that led to the abandonment of stone sleepers.

Let us consider the principles that are essential to the durability of "permanent way:" first, that the rail surface be not crushed by too great a weight on the peripheries of the wheels. If the rail be quite rigid, four tons per wheel is the limit which ordinary iron will bear. Now it is very difficult to make a rail rigid, unless the bar be sufficiently strong in itself to bear the maximum weight without deflection. If it be so strong, and be sufficiently upheld below, it is manifest that the weights of the heavy engines used must laminate and destroy it.

Secondly. The bearing surface of the chair or other material on which the rail lies, must be sufficient to prevent the crushing either of the one or the other.

Thirdly. The bearing surface of the rails and sleepers on the ballast, must be sufficient to prevent sinking and displacement by reason of the rolling loads.

Fourthly. If there be deflection, as there is on the Great Western plan, and in the cast-iron plans in short lengths, there will be a waste of steam-power.

The saddle-back rails are about five inches in depth, and about eleven inches wide. It is said they do not deflect. If so, they will be found to wear. If they do deflect, they will bend and widen, as the surface bearing appears insufficient.

Beyond the principles before laid down there is yet another. A ship requires ballast to hold her steady in the water, and the railway requires ballast to hold the rails steady. To this end the rails should get hold of the ballast; should be anchored to it.—This can only be by weight, or some kind of holding down. Teeth are held in the jaws by snags—trees in the ground by roots clogged in the earth—buildings stand on heavy foundations. Saw-cut sleepers are far inferior to rough log-sleepers or old ship timber, both in weight and adhesion. And we think that both in the saddle-back rail and the cast-iron sleeper plans, the desire to save weight and keep down cost will be fatal to durability, unless some plan be resorted to ot securing these light superstructures to an efficient quantity of ballast. A mere light surface must be constantly in process of displacement by rapidly passing trains.

We have dwelt specifically on this subject, because cheap, rapid and certain transit mainly depends on the excellence of roadway, and cheap and rapid transit is the main element in civilization.—We now approach the machinery.

Foremost in the rank on the broad gauge, and in close proximity behind it on the narrow gauge, stand samples of the largest and smallest class of locomotive engines. The former is named the "Lord of the Isles," and is said to weigh fifty-three tons with coke and water. In old classic phraseology, we might call it the tyrant of rails. It is a specimen of very beautiful workmanship, from the Great Western factory at Swindon. The parts are well proportioned; so well, that if viewed from a distance the machine does not look large. The engine is on eight wheels, the tender on six, altogether fourteen. The cylinder inside, the axle cranked, as are all broad gauge engines, save one, and the driving wheels are eight feet in diameter.—It is said that it will take one thousand passengers at great speed. But the question of economy, and convenience is, whether a fourth part of the number at four different intervals would not better subserve the wants and wishes of the public.

We have sometimes watched these engines when starting from the shed. They are supported on the four leading and two trailing wheels, and with a pressure of from thirteen to fourteen tons on the two driving-wheels. The driving-wheels commonly turn round and round without moving the machine forwards, which is a clear proof that the rails are deflecting beneath them, while the weight of the machine is upborne at the extremities. In this dilemma sharp gravel is thrown before the wheels and an interlocking surface is obtained, when with a violent impulse that shakes the ground, the machine starts forward like a tiger at the sudden aspect of raw meat. The impetus thus obtained, the machine moves on; but if the rails were inflexible it is obvious that a smaller amount of power would suffice. But if inflexible, they would tread out more rapidly. It might not be of importance to wear out rails—it might answer to replace them every week if the traffic were plentiful in proportion; but it can only be with a waste of steam that the present system can be worked. We have heard that one of these large engines is called by the drivers the "Emperor of Russia," consuming much oil and tallow.

Close behind this "tyrant of the rails," stands a small engine of first rate workmanship, called the "Ariel's Girdle," arranged upon the light system of Mr. Adams, who has long and perseveringly worked to reduce the surplus weight on railways, and proportion the weight to the load, seeking to obtain the greatest power with the smallest bulk and weight, and the minimum of friction. As usual in all cases of running counter to an established practice, he was strongly opposed; but, as usual in all true things, the truth prevailed, and many now seek not merely to travel in the same path, but to claim the precedence. The "Ariel's Girdle" is on four wheels, the driving-wheels being five feet in diameter, the leading wheels, three feet. The cylinders are outside, and nine inches in diameter. There is a tank below the engine, carrying the water for twenty-five miles, and the coke is all arranged under cover round the fire-box. All the working parts are under the direct control of the driver, close at hand, and the foot plate may be kept clean, and all as neat as a kitchen range. The engine is coupled to a four-wheeled tender carriage in a peculiar manner, so that the two together form one eight-wheeled machine, capable of flexure laterally but not vertically, and with an arrangement for the driver to tighten or loosen as the engine runs, to obtain rapidity on straight lines, or flexibility on curves. The tender carriage has a tank of water in the floor, sufficient for twenty-five miles, so that altogether the machine may travel fifty to sixty miles without stopping. The body of the tender-carriage is adapted to carry forty, first, second, and third class passengers, and the guard, who may serve as stroker also, if for cheap branch lines. The seats of the second class compartment fold down so that it will serve for mails or for luggage. It will travel as an express, at fifty to sixty miles per hour. The engine has a common break, the tender-carriage has a sledge-break, pressing on the rails and saving the wheels, all under the control of the driver. The whole would form a convenient private carriage for a family. Uncoupled from the tender-carriage the engine is a simple tank engine, and will draw 100 tons gross of waggons, at fifteen miles per hour; and it is adapted to couple to the second engine, forming one machine, with one driver, for increased loads. Or coupled to the tender and other carriages, it will serve to take 200 to 250 passengers at thirty-five to forty miles per hour. Or, with the eight-wheel carriage, forty-four feet in length, near it, which is adapted to run with the most perfect freedom from oscillation, and with the minimum of friction, by the reason that the wheels are all free to follow their own courses, it might travel from London to Liverpool in from four to five hours, without any damage to the road, and with a small consumption of coke. The boiler and fire box being small, will admit of considerable pressure, and by the lightness of the engine, under nine tons without water, together with its free running, it will consume very little of its own power. The patentee considers that a line worked wholly with these engines and carriages, would require scarcely any repair, while the speed might be equal to any other line; and the principle of frequent light trains instead of unfrequent heavy ones, might be thus put in practice, with a steadiness of movement enabling the passenger to read and write. Thus a narrow gauge carriage gives a floor area of nearly forty seven feet per wheel, while the max-

imum broad gauge gives very little more than thirty-nine. The carriage we are speaking of will take eighty passengers, exclusive of a guard's compartment, and it is provided with a rail-break; so obvious a mode of saving wheels and rails from damage, that we marvel that it should have been so long delayed from use. To Mr. Waddington and Mr. Macgregor, the respective chairmen of the Eastern counties and the Southeastern, the public are indebted for the introduction of this improvement.

Close to the "Ariel's Girdle" stands a "Southeastern engine," on "Crampton's patent," with the driving-wheels eight feet in diameter, placed behind the fire box. The engine has six other wheels, and an independent crank shaft to communicate the motion of the pistons of inside cylinders to the driving-wheels, which have a straight axle. The tender is on six wheels, and the machine is as powerful as those on the broad gauge. It is from the factory of the railway chieftain, Robert Stephenson, and, therefore, to commend the workmanship would be superfluous. This is one of the engines which have grown up under the contest of the gauges for superiority. In some points we differ from Mr. Crampton in opinion, as to this engine, unless for a straight line. As to the advantage of getting the centre of gravity low, for which purpose he first adopted the driving-wheels behind the piston, there cannot be two opinions; but we think that the size of the engine and its great length involves some disadvantages. But the weight being within the wheels, and not overhanging, is a manifest advantage, when obtained without making the engine too long. The driving-wheels will not slip as they do when placed centrally, and when the weight is balanced by the wheels fore and aft. We have no doubt that these engines will tell as good a tale of speed on the Southeastern as those on the Great Western; and we are glad to see the position Mr. Crampton is gradually rising to in public estimation. He has manfully fought an up-hill fight, in which he has forced powerful opponents to acknowledge his skill and merit. An Englishman, in the best meaning of the word with good perception, untiring industry, unshrinking courage, and incessant desire for advancing attainment, we may easily apprehend how he acquires and retains the respect of all manly-minded men.

In the rear of Mr Crampton's engine, stands the "Little England," a small six-wheeled tank engine, the driving-wheels four feet six inches in diameter, with inside cylinders and a crank axle. We do not like crank axles, for they are never sure against breakage, and it is a common remark that they do not last above three years. The "Little England" is one of the results following the lead of Mr. Adams's light system; and as the owner professes to have attained great results, of which we have no means of judging, we leave our readers to satisfy themselves. The "Express" was the first built by Mr. Adams, for Samuel's Eastern counties' work, and was followed up by many others—as the Fairfield, the Enfield, the Cambridge, the Whirlwind, the Running Fire, the Enniskillen, the Resurgam, the Speranza, the Ariel's Girdle, and others, the working drawings of which are chiefly made by Mr. Edward Reynolds, a pupil of Adams and Co., and one of the most rising of our practical locomotists. The cylinders of these engines vary from 3½ inches up to 9 inches. It is since the commencement of these engines that the tank engines have grown to be a fashion, i. e., the tender has in many cases been dispensed with, and the water and fuel have been added to the load of a six-wheeled engine, frequently adding to its destructive powers. The tender was originally a contrivance to remove weight from the engine, but tank engines of large size are very unprofitable servants.

The next in order is the six wheeled tank engine, by Hawthorn. There is a peculiarity of construction in this. The wheels are connected by iron bearers supporting the springs, apparently for the purpose of getting only four bearing points on six wheels, for the boiler and machinery to rest on. This diminishes the base of the spring bearing, and we think it has a tendency to rock the engine when running.

A six-wheel tank engine by Wilson, of Leeds, offers another peculiarity of construction. It has two fire boxes, and two boilers, side by side, like a doubled-barreled gun, and a single chimney. We do not see any advantages in it. There is more weight with less steam and water-space.

A large engine and tender, with driving-wheels 8 feet in diameter, stands next, chiefly remarkable for size. It belongs to the London and North-western, but we have no information as to its qualities.

A six-wheeled tank engine, by Kitson, Thompson and Hewitson, follows next, a specimen of very excellent workmanship from the Airedale foundery of Leeds. The finish is very high.

Close behind it is a six-wheeled tank engine of Fairbairn's. In this class the builder has gone to the opposite extreme; apparently satisfied with his workmanship, he has paid no attention whatever to finish.

Last comes the engine named the "Liverpool," built on Mr. Crampton's principle, by Bury, of Liverpool, for the London and Northwestern company. We do not know what the weight of the engine and tender is, but it must be considerable. It is a most perfect piece of workmanship. The portions that strike the observer are, the large driving-wheels placed behind the fire-box and combined with a low centre of gravity. The fire-box is enormous, to obtain which object the eccentrics are placed outside the driving-wheels very conspicuously.

In the foreign department there are two Belgian engines—one is called a Bogey engine, being on eight wheels, four drivers being coupled together behind, and four others applied to a swivelling truck. The friction of the peripheries of the wheels of this engine, tending to retard its progress, must be very great. The fire-box is uncommonly high, looking top heavy. In the French department there is an engine of the latter kind, the workmanship of which is as good as the principle—copied from the English engines—appears to us to be bad.

There are numerous models of engines in various places, but we have not remarked anything especially worthy of notice, save as samples of workmanship. Amongst the essentials of railways the most important are bridges, and the exhibition affords samples of many varieties. The most remarkable are the metallic structures. The only model of a cast-iron bridge that we remember is the "high level" of Mr. Stephenson, at Newcastle. In wrought iron the principle of the arch has not, that we are aware, ever been adopted, cast iron having so much more compressive power of resistance. Wrought iron has only been applied in the girder form, the principle of which is tension of the lower surface and compression of the upper. A model of the Britannia bridge shows this, as well as an American and Prussian structure, the former full size, the latter a model. A bridge, also, by Dr. Spurgin, proposed to cross the Thames at Westminster, is of the same class, though appearing almost like a simple chain, but we believe the first chain ever contrived to be rigid, which it is in one direction, though capable of bending in the opposite direction.

Amongst the collection is a very simple girder, analogous to the chain described, save that the tensile portion is a round iron bar, and the upper or compressive portion is a series of short cast-iron vertebræ threaded upon it. It forms a considerable arch, and resembles a spine of some long vertebrated animal. The whole of its strength resolves itself into the power of a screw-thread on each end of the bar to resist breaking off. If the weight were to slip these threads, or the bar to break, the whole would tumble down. Yet the planner proposes to build a bridge on that scheme upwards of a thousand feet span.

Amongst all these models we miss a sample of Captain Warren's open girder bridge, the lower part of which is a chain to which is attached by their lower angles a series of triangles, the upper angles of which abut together. In that mode, by simply putting wedges between the upper angles, the girder may be made to assume any amount of curvature that may be desired, so as to form an arch not requiring external abutments. This simple bridge, now generally recognised as one of the best forms of structure, met with much opposition when first introduced. One that was erected at the London terminus of the Southeastern railway, to carry an ordinary roadway, was broken by the over-piling of a large mass of bricks. The parish authorities, with Dogberry wisdom, resolved that it was unsafe. The company refused to waste their money in removing it, engineers were called in on both sides, with the usual result of conflicting opinions. The final result has been, that after a series of experiments, the objectors and their supporters have been vanquished, and the bridge is now acknowledged to be one of the strongest, lightest and cheapest that mechanical art has yet produced. Yet it was by the merest chance that the bridge escaped condemnation. Professionally jealousy would have excluded it because the inventor was "not one of us," but professional rivalry stepped in and neutralized the jealousy of clique, saving for public use an invention useful to the public. One great advantage of this kind of bridge is its facility of erection, as simple as that of any ordinary suspension bridge, without a scaffold. Another is, that though not wholly constructed of wrought iron, all parts are easily visible and accessible, to guard against oxydation. But we do not consider it adapted for very large spans, for which we would resort to a different mode of construction.

The model of the bridge over the Chepstowe river appears to combine several principles of structure, and differs widely from those before described. It would be difficult to pronounce an opinion from the imperfect workmanship, or to judge of the real structure therefrom. The whole roadway appears to depend on six screw-bolts connected with tension chains, serving to elevate and depress it.

and are bringing them into general use upon their road.

One year's experience with the above improvement, has fully convinced me that there has never been anything offered to the public for that purpose which possess such intrinsic value; in fact, this is an improvement which seems to overcome all the difficulties found in all the various kinds now in use. It possesses very many advantages over all others: Some of which are [first] the first cost is much less than that of most boxes in use. [Secondly] 75 per cent is saved in oil; one gill applied to each Journal once a month, or one quart to an eight wheel car, is all these boxes require per month [Thirdly] no dust can gain access to the Journal, which is constantly lubricated with clean oil; hence the saving in repairs of Journals and composition bearings, is a matter of importance. [Fourthly,] its construction is truly simple—not complicated, having nothing liable to become loose by constant and severe service. [Fifthly] for convenience there is nothing which approaches this improvement.—The composition bearings may be removed from the Journals of an eight wheel car, by one man, and returned, or duplicates, in twenty minutes, while under the car: the same would require two men, at least half a day with other boxes in use.—The trucks and wheels using these boxes, are free from oil and dirt, usually seen upon all railroad cars, at great expense to the corporation.

NATH'L JACKSON.
Supt. Car Building and Repairs, F.R.R. Co.

—

Boston, March 9, 1849.

I hereby certify, that I have examined a box for Car Journals, invented by Mr. Lightner of Roxbury, Mass, and I have thought so well of it that I have adopted it on our railroad, I have known of its success on other roads.

S M. FELTON,
Supt. F. R. R.

—

Office of the Central R. R., N. J.,
Elizabethtown, May 1849.

H. F. ALEXANDER, Esq.,

Dear Sir:—Your favor, [wishing to be informed how we liked Lightner's patent axle boxes for R.R. Journals,] has been duly received; in answer we would say, we have used the boxes on Locomotive tenders one year, more or less, and on our cars some six months. I consider them the best boxes in every respect, I have ever used, or even seen used on any other roads—for safety, durability and the economy pertaining to all the details connected with the boxes and Journals of R. R. Car wheels; and we shall adopt them upon this road.

Yours Respectfully,
JOHN O. STEARNS.
Supt. Central Railroad Co., N. J.

—

Manchester, N. H., Nov. 1st, 1850.

H. F. Alexander, Sir,

I have used "Lightner's Boxes" under all the Cars of the Manchester and Lawrence railroad, and feel no hesitation in saying that I think them to be the best boxes now in use.

Yours, &c.,
THEODORE ATKINSON, Agent.

—

Cheshire R. R. Office, Keene, March 5th, 1851.

Mr. H. F. Alexander,

Sir,—Lightner's Patent Boxes have been used on the Cheshire R. R. about a year, and have given the highest degree of satisfaction.

All the Passenger Cars now in use, and a considerable number of Merchandize Cars are furnished with them, and they will take the place of the Common Boxes on all the cars as fast as circumstances will permit.

Very Resp't.
L. TILTON,
Supt. Cheshire R. R.

—

Boston and Worcester Railroad, Boston, April 1st, 1851.

H. F. Alexander, Esq.,

Dear Sir,—Lightner's Patent oil saving box for railroad cars, has been adopted by this corporation; we are taking out the common and substituting the Lightner's at the rate of fifty boxes per month; it will soon take the place of all others, as it is decidedly preferable to any heretofore used by this corporation.

G. TWITCHELL, Supt.

Statement of amount of oil used on 32 8-wheel freight cars, on the Boston and Providence Railroad (with Lightner's Boxes) from March 10, 1849, to February 27, 1851, and upon 12 8-wheeled passenger cars from September 8, 1849, to February 27, 1851.

FREIGHT CARS.

Amount Oil.	No. months.	Amount Oil.	No. months.
1.—21 pts.	10	17.—23¼ pts.	14
2.—19 "	6	18.—23½ "	11
3.—25 "	13	19.—36 "	21
4.—18 "	7	20.—22 "	10
5.—22 "	12	21.—38½ "	24
6.—24 "	13	22.—29 "	23
7.—20 "	11	23.—35½ "	23
8.—21 "	11	24.—37½ "	23
9.—23½ "	10	25.—51 "	23
10.—21 "	9	26.—31½ "	24
11.—20 "	9	27.—28½ "	23
12.—21½ "	11	28.—36 "	23
13.—19 "	8	29.—50½ "	24
14.—25½ "	17	30.—50 "	23
15.—20½ "	10	31.—41 "	23
16.—31 "	18	32.—39½ "	23
		Total, 925½ pts.	510

PASSENGER CARS.

1.—19½ pts.	18	7.—30 pts.	18
2.—25½ "	18	8.—25½ "	18
3.—33½ "	16	9.—29 "	18
4.—19 "	15	10.—46½ "	17
5.—15 "	15	11.— 9 "	9
6.—22 "	18	12.—65½ "	17
		Total, 340 pts.	197

Averaging 1 4-5 pints of oil for freight, and 1 7-10 for passenger cars per month only!

All orders and enquiries promptly attended to.

BRIDGES & BROTHER,
No. 64 Courtlandt st., New York.

July 25, 1851.

To Boiler Makers, Engineers, etc., etc.

PATENT LAP-WELDED IRON TUBES,
Manufactured by the
BIRMINGHAM PATENT IRON TUBE CO.
UNDER
PROSSER'S PATENT,
from one and a quarter to eight inches in diameter.

These tubes are well known for their superiority over all other descriptions for Locomotive, Marine and other Steam Engine purposes, for which they are used very extensively in Great Britain and on the Continent of Europe.

For sale in quantities to suit purchasers, by
WILLIAM BIRD & CO.,
44 Wall st., New York.

July 26. 1851.

To Railroad Companies.

THE undersigned has discovered and patented an imperishable, cheap, and sufficiently elastic substance, to be introduced between the sill and rail, so that the stone sill can be used in place of the wooden sill: entirely overcoming that rigidity where the rail is laid directly on stone. Address

J. B. GRAY, Philadelphia.

July 10, 1851. 4m

To Contractors.

Peru and Indianapolis Railroad.

PROPOSALS will be received at the office of the Peru and Indianapolis Railroad, in Noblesville, until the evening of the 13th of August next, for the Grading of the line of the above road from Noblesville to Peru, a distance of fifty miles. Also the masonry for Bridges over the Wabash, Big Pipe and White Rivers.

The proposals are to be addressed to W. J. HOLMAN, Esq., Chief Engineer, at the Company's Office, where plans and specifications of the work may be seen. Payments will be made monthly in cash, reserving 15 per cent. till the contracts are completed.

Indianapolis, July 12, 1851.

European and North American Railway.

THE undersigned, the three persons first named in the first section of an act passed by the Legislature of Maine, and approved the twentieth day of August last past, entitled "An Act to incorporate the European and North American Railway Company," and being specially authorised therefor in and by said act, hereby give public notice that, for the purpose of receiving subscriptions to the stock of said company, as established by the act aforesaid, according to the provisions thereof, not exceeding forty thousand shares, books of subscription will be opened under the direction of the undersigned, according to the regulations prescribed, at the time and places following, viz:—On WEDNESDAY, the Twentieth day of August next,

At Calais,	Maine,	with	Noah Smith, Jr., Esq.
Eastport,	do.	"	Col. Bion Bradbury.
Machias,	do.	"	Walker & O'Brien,
Ellsworth,	do.	"	Seth Tisdale, Esq.
Oldtown,	do.	"	Geo. P. Sewall, Esq.
Bangor,	do.	"	Geo. W. Pickering, Esq.
Orono,	do.	"	Hon. Israel Washburn, Jr.
Waterville,	do.	"	Hon. Timothy Boutelle.
Brunswick,	do.	"	Prof. William Smyth.
Augusta,	do.	"	B. A. G. Fuller, Esq.
Belfast,	do.	"	John Y. McClintock, Esq.
Portland,	do.	"	John B. Brown, Esq.
Portsmouth,	N.H.		Hon. I. Goodwin.
Salem,	Mass.		Stephen A. Chase, Esq.
Boston,	do.	"	Francis Skinner & Co.
Lowell,	do.	"	John Wright, Esq.
Worcester,	do.	"	Charles Washburn, Esq.
Providence,	R.I.,	"	Billings Brastow, Esq.
Hartford,	Conn.,	"	Hon. C. F. Pond.
New Haven.	do.	"	Allen Prescott, Esq.
New York,	N.Y.,	"	R. & G. L. Schuyler, No. 2 Hanover street.
Albany,	do.	"	John V. L. Pruyn, Esq.
Troy,	do.	"	Hon. John D. Willard.
Philadelphia,	Pa.	"	Hon. Wm. C. Patterson.
Montreal,	Canada,		Hon. John Young.
Quebec,	do.	"	J. B. Forsyth, Esq.

Said books will remain open for ten successive days at the places and with the persons aforesaid.

Dated at Portland, this sixteenth day of June, A. D. 1851.

ELIJAH L HAMLIN,
ANSON G. CHANDLER,
JOHN A. POOR.

Trautwine on R. R. Curves.

By JOHN C. TRAUTWINE, Civil Engineer,
Philadelphia, Pa.

IN press, and will be published in a few days; accompanied by a Table of Natural Sines and Tangents to single minutes, by means of which all the necessary calculations may be performed in the field.

This little volume is intended as a field-book for assistants; and will be found extremely useful, as it contains full instructions, (with wood cuts) for laying out, and adjusting curves; with Tables of Angles, Ordinates, etc., for Curves varying from 13 miles, down to 146 feet Radius.

A portable Table of Natural Sines and Tangents to minutes, has for a long time been a desideratum among Engineers, independently of its use in laying out curves.

The volume is neatly got up in duodecimo; and handsomely bound in pocket-book form.

Sold by Wm. Hamilton, Actuary of the Franklin Institute, Philadelphia. Price $1.

Also in press, and will be issued in a few weeks, "*Trautwine's Method of Calculating Excavation and Embankment.*"

By this method, which is entirely new, (being now made known for the first time) the cubic contents are ascertained with great ease and rapidity, by means of diagrams, and tables of level cuttings. Thin octavo; neatly half bound, $1. For sale by Wm. Hamilton.

June 28, 1851.

Railroad Iron.

CONTRACTS made by the subscribers, agents for the manufacturers, for the delivery of Railway Iron, at any port in the United States, at fixed prices and of quality tried and approved for many years, on the oldest railways in this country.

RAYMOND & FULLERTON, 45 Cliff st.

Notice to Contractors.

Steubenville and Indiana Railroad.

PROPOSALS will be received at the Office of the Steubenville and Indiana railroad company in Steubenville, until the first day of October next, for the Grading and Masonry of the first division of the road extending from Steubenville to the Connotten valley and also for the construction of the entire road between Steubenville and Coshocton; and also distinct proposals for the construction of that portion of the road extending from Coshocton to Newark.

The entire length of this line is about 110 miles, and it contains work of all descriptions, in great variety, some of which is quite heavy.

Proposals will be received for the Grading and Masonry of the first division entire or in sections of about a mile each, the Company reserving the privilege to make such disposition of the whole work, as may appear most conducive to its interests.

Plans, profiles and specifications can be seen at the office of the Company after the 15th of September, and further information may be obtained on application to J. Blickensderfer, jr., Chief Engineer, or to the undersigned,

D. KILGORE, President.

Notice to Contractors.

Engineers Office, E. T. & V. R. R. Company, Greenville, E. T., June 5th, 1851.

PROPOSALS will be received until the 1st day of October next, for the Grading and Masonry of that part of the E. T. & V. Railroad between the Eastern terminus of said road at King's Meadow, and Rheatown, in Greene County, a distance of about forty-seven miles. A large amount of very heavy work, both in Grading as well as Masonry, will be found on this division, offering strong inducements to able Contractors.

Maps, Profiles, and Specifications can be seen at this Office, on and after the 20th of July next.

The Company reserve the right to reject all, or any proposals that they deem unsatisfactory.

Proposals should be directed to the Treasurer and Secretary of the E. T. & V. Railroad Company, Jonesborough, E. T.

LLOYD TILGHMAN,
Chief Engineer.

Railroad Lanterns.

COPPER and Iron Lanterns for Railroad Engines, fitted with heavy silver plated Parabolic Reflectors of the most approved construction, and Solar Argand Lamps; manufactured by

HENRY N. HOOPER & CO.,
No. 24 Commercial St. Boston.

August, 16, 1849. 6m33

Railroad Iron.

THE Subscribers, Agents for the Manufacturers, are prepared to contract for the delivery of Railroad iron at any port in the United States or Canada, or at a shipping port in Wales.

WAINWRIGHT & TAPPAN,
29 Central Wharf.

Boston, June 1, 1851.

Bowling Tire Bars.

40 Best Flange Bars 5½x2 inches, 11 feet long.
40 " 5½x2 " 7 feet 8 in. long.
40 " Flat " 6x2 " 11 feet long.
40 " 6x2 " 7 feet 8 in. long.

Now in store and for sale by

RAYMOND & FULLERTON,
45 Cliff street.

To Railroad Companies, Machinists, Car Manufacturers, etc., etc.

CHARLES T. GILBERT,

NO. 80 BROAD ST., NEW YORK,

IS prepared to contract for furnishing at manufacturer's prices—

Railroad iron,
Locomotive Engines,
Passenger and Freight Cars,
Car Wheels and Axles,
Chairs and Spikes.

Orders are invited; and all inquiries in relation to any of the above articles will receive immediate attention

THE Fourth Annual Exhibition of AMERICAN MANUFACTURES, by the MARYLAND INSTITUTE *for the Promotion of the Mechanic Arts*, will be opened in Baltimore on the 20th October, 1851.

The Exhibition will be held in the SPLENDID NEW HALL of the Institute, (fronting on Baltimore street) now being rapidly completed. Their edifice is centrally situated, chaste in its architecture, solid in its construction, and is *by far the largest and most complete building in the United States, devoted to the Mechanic Arts.* It may be added that this building is 355 feet long by 60 in breath, with an average height of 68 feet, containing some twelve apartments, the largest of which is 255 feet by 60, and that the cost will be over $70,000.

To this Exhibition, the Managers ask the attention of all engaged in industrial pursuits throughout the country, and cordially invite them to contribute specimens of their best productions for public inspection, and to compete for the prizes offered by the Institute. These prizes consist of GOLD and SILVER MEDALS, DIPLOMAS, etc., which were last year distributed as follows:—*Gold Medals*, 16; *Silver ditto*, 90; *Diplomas*, 60; besides 85 articles of Jewelry, etc., to ladies. *Fair play will be scrupulously observed towards all*, and every facility of Steam power, shafting, fixture, labor, &c., &c., will be amply provided *free of expense.* The machinery will be under a special superintendent, and a fine display of it is looked for. The last exhibition of the Institute was visited by more than 40,000 persons, and with their vastly improved accommodations and alterations, this number will be doubled at the coming display, embracing many Virginians, Pennsylvanians, and other strangers from the South and West.

Joshua Vansant, President.
Ed. Needles, F. A. Fisher, } Vice Presidents.
Samuel Sands, Rec. Sec'y.
Wm. Prescott Smith, Cor. Sec.
F. J. Clare, Treasurer.

BOARD OF MANAGERS.

Ross Winans,	Simeon Alden,
P. S. Benson,	J. T. Watson,
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Richard Edwards, Jr,	*W. Abrahams*,
Wm. Bayley,	*Thos. Trimble*,
R. Eareskson,	*Chas. Suter.*

(☞ The last nine *in Italics* are the Committee on Exhibition.)

The Hall will be opened for the reception of goods on MONDAY, 13*th October*; on the next Monday, 20th, at 7 P. M., the Exhibition will be formally opened to the public, and will *positively* close on Wednesday, 19th November. Articles *for competition* must be in the Hall by *Thursday* night, Oct. 16, *unless delayed in shipment after starting in ample time.*

Those who intend depositing, will give the Committee or the Agent, notice as early as possible, stating *the nature of the goods, and probable amount of room required*, to exhibit them to advantage

☞ Circulars, containing a view of the new Hall and the full regulations of the Committee, with special information, if required, may be had promptly, by addressing the undersigned, or the Institute's Agent, J. S. Selby, Baltimore, *post-paid.*

ADAM DENMEAD,
Chairman Com. on Exhibition for 1851.

SUPERIOR BLACK WRITING & COPYING

INK.

Jones' Empire Ink.

87 Nassau st., Sun Building, New York city.

Net prices to the trade—

Quarts, per dozen,	$1 50	6 oz. per dozen,	$0 50
Pints, "	1 00	4 " "	0 37½
8 ounces, "	0 62½	2 " "	0 25

On draught per Gallon, 20 cents.

This is the best Ink manufactured, it flows freely, is a good copying ink, and will not mould, corrode, precipitate or decay. Orders for export, or home consumption, carefully and promptly attended to by

21tf THEODORE LENT.

To Railroad Companies, etc.

The undersigned has at last succeeded in constructing and securing by letters patent, a Spring Pad-lock which is secure, and cannot be knocked open with a stick, like other spring locks, and therefore particularly useful for locking Cars, and Switches, etc.

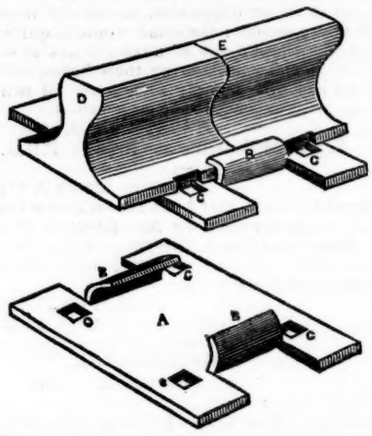
I also invite attention to an improved PATENT SPRING LOCK, for SLIDING Doors to Freight and Baggage Cars, now in use upon the Pennsylvania Central, Greensville and Columbia, S.C., Reading, Pa., and other Railroads.

Companies that are in want of a good Pad-lock, can have open samples sent them that they may examine and judge for themselves, by sending their address to

C. LIEBRICH,
46 South 8th St. Philadelphia.

May 9, 1851.

The American Railroad Chair Manufacturing Co.



ARE prepared to make WROUGHT IRON RAIL ROAD CHAIRS, of various sizes, at short notice.

By use of the WROUGHT IRON CHAIR, the necessity of the wedge is entirely done away—the lips of the chair being set, by means of a sledge or hammer, close and firmly to the flange of the rail.

The less thickness of metal necessary in the Wrought Iron Chair gives much greater power and force to the spikes when driven—and consequently a much less liability to the spreading of the rails by reason of the spikes drawing or becoming bent.

The less weight necessary in the Wrought Iron Chair, will enable us to furnish them at a cost much below that of CAST IRON CHAIRS.

DESCRIPTION OF THE ABOVE CUTS.

Figure 1 is a perspective view of the rail secured in the chair, and fig. 2 is a perspective view of the chair itself. D, E, are sections of two rails placed together, and secured at the joint on the chair by the jaws *B*, B. The chair is bolted down by spikes C, C. In fig. 2, the chair is represented as made of a single block or plate A of wrought iron.

The chair is set in its proper place on the track, spiked down, and the ends of the two rails brought together within the jaws as represented in fig. 1.

For further information address,

N. C. TROWBRIDGE, Secretary,
Poughkeepsie, N. Y.

June 1, 1851.

Railroad Commission Agency.

THE Subscriber offers his services to Railroad Co's and Car Makers for the purchase of equipment and furniture of roads and depots and all articles and materials required in the construction of cars, with cash or approved credit. No effort will be spared to select the best articles at the lowest market price.

He is sole Agent for the manufacture of the ENAMELED CAR LININGS, now in universal use. The best Artists are employed in designing new styles, and he will make to order pieces with appropriate designs for every part of the car, in all colors, or with silver grounds and bronzed or velvet figures.

He is also Agent for Page's Car Window Sash Fasteners, which is preferred by all who have used it to any other.

CHARLES STODDER,
75 Kilby st., Boston.

June 20, 1851. 3m.